COMMODORE USERS

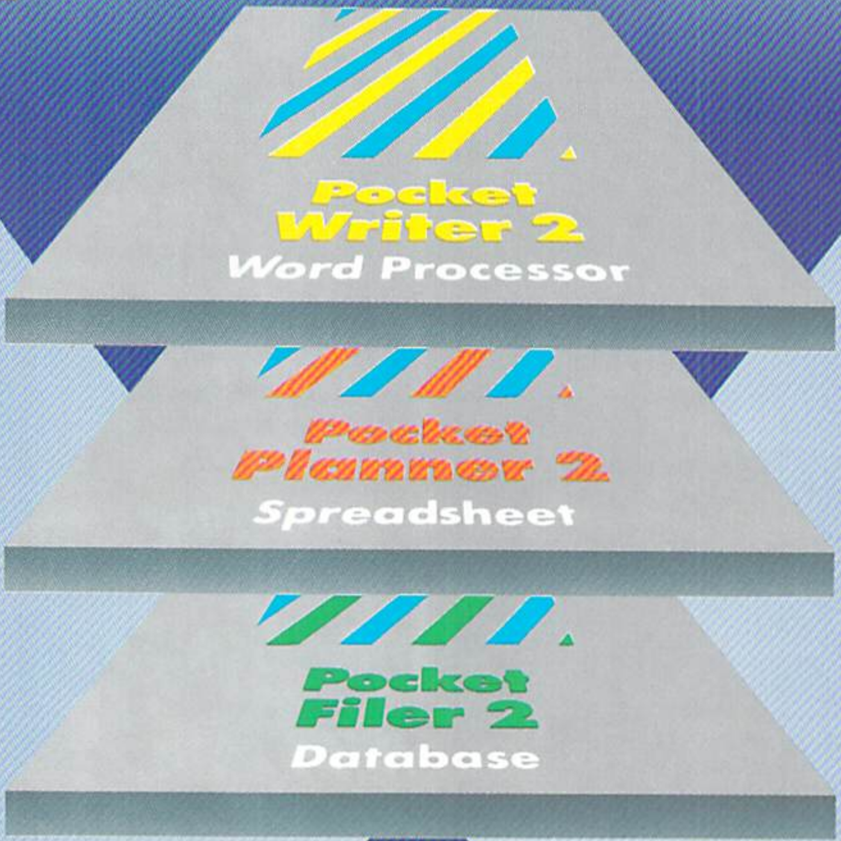
Ahoy!

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Super Solutions 2



The Best Just Got Better

We just did something only the best can do! We made our award winning* software for the Commodore™ 128 and 64 computers even better!

Introducing... Pocket Writer 2/word processor **Pocket Planner 2**/spreadsheet **Pocket Filer 2**/database

Our new Pocket 2 series offers features usually found only in much more sophisticated applications software. Features that include: compatability with the new GEOS operating system†, ability to work with the Commodore RAM expander to allow a RAM disk, mouse support with pull down menus, 1571 burst mode for faster file loading, increased support for two single disk drives, automatic configuration for screen color, format and printer selection†.

Sophisticated software, yes, and still easy to use. You can be up and running in under 30 minutes even if you haven't operated a computer before.

Now, when you upgrade your Commodore™ 64 to a 128, Pocket software helps make it a breeze. The new Pocket 2 software has both 128 and 64 applications on the same disk. So when you buy one you are actually buying two software packages. The cost only $59.95 (U.S.).

You can buy all three Pocket 2 applications, Pocket Writer 2, Pocket Planner 2 and Pocket Filer 2 in one convenient Superpak for the low price of only $99.95 (U.S.). A super way to discover all the integrated features of Pocket 2 software and save almost eighty dollars.

As a companion to Pocket Writer 2, a **Dictionary Disk** containing 32,000 words (expandable to 40,000) is available. The cost $14.95 (U.S.).

For those of you who have already discovered the many benefits of owning Pocket software; we offer all registered owners upgrade Pocket 2 software for only $19.95 (U.S.) plus 3.00 (U.S.) shipping and handling! Available only by writing to Digital Solutions Inc.

*Commodore's Micro-computers Magazine, independent reviewers, rated the original Pocket Writer 128/64 and Pocket Planner 128/64 software the "Annual Best of 1986" in the productivity category.

International Distributor Enquiries to:

Digital Solutions Inc.

2-30 Wertheim Court
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THE COMMODORE USERS

Ahoy Access Clipper

10% OFF ANY ACCESS PRODUCT...

This issue we are pleased to have **Access Software** joining us with an offer for the first time. **Access**, as you probably know, makes some very interesting programs, including *Leader Board,* a nifty pro golf simulator, *10th Frame,* a professional bowling simulator, and their latest and greatest product, the *Robotic Workshop.*

When I was three years old, I wanted more than anything else in the world to have an Erector Set. Fortunately for my sons, the *Robotic Workshop* from **Access Software** is a computer-age version of the Erector Set. They have had a fantastic time with this fabulous, space-age learning tool. With hundreds of projects and experiments, the *Robotic Workshop* shows how computers and other devices interact in the real world. Whether you're a beginner dabbling in robotics or an enthusiastic hobbyist, you'll appreciate seeing how this fascinating new field will be interacting with your life in the future. Demonstrating computer-controlled, electro-mechanical operation through experiments with hardware and software, each unit of the *Robotic Workshop* contains the computer interface to connect to your home or personal computer. Also included with the *Workshop* are all motors, sensors, snap-together mechanical parts, software, complete project experiment instructions, and a 136-page spiral-bound manual. For more information on the *Robotic Workshop,* look for **Access Software**'s ad in this month's issue of *Ahoy!*

And now, until February 1, 1987, you may purchase the *Robotic Workshop* or any of the other excellent programs from **Access Software** for 10% OFF when you order directly from them. You may order by phone with your VISA or MasterCard by calling 801-298-9077 and mentioning that you saw this offer in the *Ahoy! Access Clipper.* (Please do not call their 800 number to order!) Or, you may use the handy coupon on page 3 of this *Clipper.* But don't wait, because this offer disconnects on February 1, 1987.

Ahoy! *Readers:*

Happy Holidays! The holidays are upon us and it's time to think about gift giving.

In this issue of our Ahoy! Access Clipper, *you'll find lots of great offers to help you with your gift selections for fellow computer enthusiasts.*

Of special note this issue are the generous offers from QuantumLink, Value-Soft, Abacus, Chipmunk, Abby's and Alsoft. These kind advertisers have gone out of their way to come up with great offers to tempt you.

So enjoy the holidays and see you in March!

Admirally yours,

Joe Ferguson

Joe Ferguson
Director
Ahoy! *Access Club*

SUPER SAVINGS ON PAGE THREE

GREAT SAVINGS FROM ABACUS...

Abacus Software is one of the leading marketers of Commodore-compatible software. They're the helpful people who bring you the popular *Super C Language. Super C* is **Abacus**' Kernigan and Ritchie implementation of the well-respected C programming language. *Super C* is not just a program, but a complete development system. It includes a full-function source program editor, a fast machine language compiler, and a linker to use the fast graphics and math libraries. *Super C* comes in versions for the C-64 and the C-128, and the C-128 version features RAM disk support.

Abacus has also recently published a new book you should know about. It's called *BASIC 7.0 Internals,* and is written for the C-128 owner. With exhaustive, detailed coverage of the inner workings of the C-128's BASIC interpreter, using *BASIC 7.0 Internals* you'll learn how to "hook" into BASIC, perform useful functions with detailed programming utilities, and even delve into the complete ROM listings of *BASIC 7.0.*

This month **Abacus** wants to give you two real good reasons for trying their excellent products, so for a limited time the **Abacus** coupon on page 3 of this *Clipper* is redeemable for $5 OFF the purchase of any book and $10 OFF the purchase of any software package, purchased directly from **Abacus**. (This coupon is not good for optional diskettes with book, nor for subset Pascal 64.) You must redeem this coupon through the mail, but don't wait, because this coupon is invalid after February 1, 1987.

2 FOR 1 FROM ALSOFT... In the last *Clipper,* we offered $10 SAVINGS on **Alsoft**'s valuable *Race Analysis System.* This month, the offer is even better. With this unique handicapping system, you can play the ponies (or the dogs), replacing hours of hand calculations with five minutes of typing. **Alsoft**'s *Race Analysis System* allows you to input cross references from up to 20 races and the program predicts winners, quinellas, perfectas, exactas, trifectas and trifecta boxes. For more information on **Alsoft**'s *Race Analysis System,* look for their ad in this month's issue of *Ahoy!* For a limited time, **Alsoft** is making you *Ahoy!* readers a fantastic offer: Order one *Race Analysis System* and you'll receive the two-pack ABSOLUTELY FREE. Each order will also include the *Master Analysis Development Package,* enabling you to build, develop and fine tune computerized handicapping systems for all kinds of sporting events. Plus, you'll receive the FREE *Pro Football Handicapping Module.* All of this software is available to you for only $39.95, and that includes shipping and handling. To place your order, just clip the **Alsoft** coupon on page 3 of this *Clipper* and send it along with your payment. For faster service, you may call 412-233-4659 and mention that you saw this offer in the *Ahoy! Access Clipper.* All **Alsoft** programs come with a 30-DAY MONEY-BACK GUARANTEE. (Pennsylvania residents will need to add 6% sales tax.) Place your order TODAY, for this offer expires February 1, 1987.

5 FREE DISKS WITH PURCHASE...

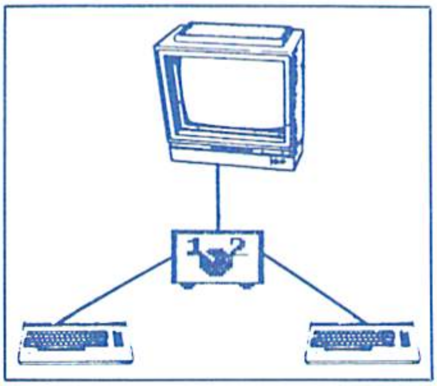
American International Computer Products (AICP) sells hardware and software at good prices, prices worth looking at when you're in the market for Commodore and Commodore-compatible products. We have all been spoiled by the wonderful offers that **AICP** provides to us *Clipper* after *Clipper,* and this issue is no exception. This issue **AICP** is holding over their offer of 5 FREE DISKS with the purchase of two 10-packs. The disks are all guaranteed, first quality, single-sided, double-density, and regularly sell for $7.95/10-pack. That's a 20% SAVINGS—not to be missed! You will need to add $3.50 to cover shipping and handling. To take advantage of this wonderful offer, simply clip the coupon on page 3 of this *Clipper* and send it along with $19.30 to **AICP.** (New York residents will need to add appropriate sales tax.) Or, you may call **AICP** at 800-634-AICP (in New York State at 718-351-1864), mention you saw this offer in the *Ahoy! Access Clipper,* and order with your credit card. (Credit card orders are subject to a 4% surcharge.) But don't delay—'cause this offer disappears on February 1, 1987.

COMMODORE CALENDAR OF EVENTS

Dec. 4-7	**The 1986 World of Commodore IV** Toronto Int'l Centre	Hunter Nichols Inc.	Patricia Mills (416) 595-5906
January 8-11 (Trade Only)	**The Consumer Electronics Show** Las Vegas Convention Center	EIA/Consumer Electronic Group Washington, D.C.	Dennis Corcoran (202) 457-4919

SAVE OVER 15% ON VALUE SOFT'S BLACK BOOK...

There's a company which you should definitely get to know. They advertise in every issue of *Ahoy!*, and have a unique reputation for being THE source for hard- or impossible-to-find products. The



name of the company is **Value-Soft**, and they really listen to their customers. When a number of customers call requesting some device that they do not currently sell, they take the initiative and either find the product so that they may offer it for sale, or they create it. I think this policy is terrific, and so will you when you discover you can't live without some device you need and can't find. One such product created by **Value-Soft** is their new Monitor Switch. This handy device allows you to use the same monitor with two computers as easily as flipping a switch. The Monitor Switch sells for only $39.95, and I predict that **Value-Soft** will sell a lot of them. For more information on **Value-Soft**'s Monitor Switch, look for their ad in this month's issue of *Ahoy!*, and while you're there, check out *The Black Book of C-128.* With over 75 easy-to-read charts and tables, this valuable reference guide has over 260 pages of solid information. **Value-Soft** is so sure that you'll find this reference book indispensible that they offer a 10 DAY MONEY-BACK GUARANTEE. And to make buying *The Black Book of C-128* absolutely irresistible, for a limited time **Value-Soft** is offering $3 OFF the regular price of $15.95. Simply clip the coupon on page 3 of this *Clipper* and send it along with your order. You will need to add $2 for shipping and handling. But don't delay, because this offer switches off February 1, 1987.

FREE *GORTEX AND THE MICROCHIPS* FROM ABBY'S SOFTWARE...

Abby's Discount Software sells a wide range of Commodore and Commodore-compatible software at good prices. You may see part of their large selection in this issue of *Ahoy!* Their offer is really wonderful: The first 100 lucky *Ahoy!* readers to place a software order for $20 or more from **Abby's** in the next two months will receive the award-winning educational program *Gortex and the Microchips* ABSOLUTELY FREE. This delightful game is a unique concept for teaching young people to program in BASIC using a space adventure story. You may order from **Abby's Discount Software** by clipping **Abby's** coupon on page 3 of this *Clipper,* or by calling 800-282-0333 (in Ohio, call 513-879-9699) and mentioning that you saw this offer in the *Ahoy! Access Clipper.* But please hurry. You surely don't want to miss out on this great offer.

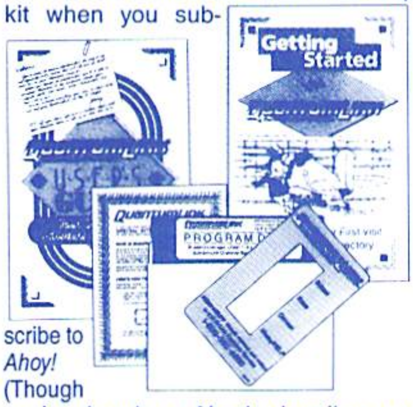
10% OFF YOUR FIRST ORDER...

With a super selection of Commodore and Commodore-compatible hardware and software at very competitive prices, **Computer Centers of America** deserves your call when you're in the market. This month their ad in *Ahoy!* features a variety of printers and other hardware, plus Epyx games at $19.95. **Computer Centers of America** wants you to get to know them, because they believe "To know them is to love them." So, with the **CCOA** coupon on page 3 of this *Clipper,* you may take 10% OFF your first order. You may place your order by telephone. Just call 800-631-1003 or 800-221-2760. In New York State, call 800-548-0009. There's no additional charge for using your credit card, but you must mention that you read about this offer in the *Ahoy! Access Clipper.* Call or write TODAY, because this offer expires February 1, 1987.

Ahoy!

FREE MODEM...

QuantumLink is one of the better bulletin board services for online games, Commodore user group support, software reviews and live conferences. The advertisement on the inside back cover of this issue of *Ahoy!* tells you how you can receive a free **QuantumLink** membership kit when you sub-



scribe to *Ahoy!* (Though you're already an *Ahoy!* subscriber, you can take advantage of this offer by extending your existing subscription.)

Additionally, **QuantumLink** is making the following offer available only to *Ahoy!* Access Club members: you can get FREE **QuantumLink** software *plus* a FREE 300 baud auto-dial modem—when you pay for 4 months of **QuantumLink** Basic Service ($9.95/month) at $39.80. Order your FREE **QuantumLink** software and FREE 300 baud auto-dial modem by either clipping the coupon on this page or sending your check for $39.80 to cover your first 4 months of **QuantumLink** Basic Service to: Quantum Computer Services Inc., 8620 Westwood Center Drive, Vienna, VA 22180—or for faster service, call 1-800-392-8200 and ask for Dept. 25. This offer expires December 1987.

GREAT OFFER FROM CHIPMUNK...

Chipmunk Software sells some neat software through the mail. Their *1541 M.A.S.H.* program and a screwdriver will allow you to service your 1541 yourself. With this helpful program you may check and adjust your head alignment, adjust the RPM's, and even inspect disks for errors. And that's only one of **Chipmunk**'s handy programs. See their ad in this month's issue of *Ahoy!* for more valuable **Chipmunk** programs. Until February 1, 1987, when you purchase *any* software from **Chipmunk**, they'll send along a blank diskette ABSOLUTELY FREE. Furthermore, when you order over $19, you may take 10% OFF the price of the programs. You will need to add $2 for shipping and handling, on C.O.D. orders only. To order, just clip the coupon on this page of the *Clipper.* For faster service, you may also call 800-331-3428, but be sure to mention that you saw this offer in the *Ahoy! Access Clipper.* Please don't delay, 'cause this offer goes into hibernation forever on February 1, 1987.

10% OFF FROM ACCESS SOFTWARE

Mail to: Access Software
#A 2561 1560 West
Woods Cross, UT 84087

For faster service, call 801-298-8077.
VISA and MasterCard accepted.

Yes, Access Systems, I want to SAVE 10% on your excellent programs. My order is enclosed.

2 FOR 1 FROM ALSOFT

Mail to: ALSOFT / 305 Large Avenue
Clairton, PA 15025

For faster service, call 412-233-4659.
VISA and MasterCard accepted.

Yes, ALSOFT, I want to get 2 of your *Race Analysis Systems* for the price of 1. I understand I'll also receive your *Master Analysis Development Package,* as well as your *Pro Football Handicapping Module,* ABSOLUTELY FREE. My payment of $39.95, which includes shipping and handling, is enclosed. My choices of *Race Analysis Systems* are specified below. Choose two:
☐ Harness ☐ Thoroughbred ☐ Greyhound

FREE PRINTER PAPER WITH PURCHASE FROM WHITE HOUSE

Mail to: White House Computer
P.O. Box 4025
Williamsport, PA 17701

For faster service, call 800-351-3442.
Or in PA, 717-322-7700.

Yes, White House, I want to have 250 sheets of FREE PRINTER PAPER. My printer order is enclosed.

MORE THAN 15% OFF VALUE-SOFT'S BLACK BOOK

Mail to: Value-Soft
9513 S.W. Barbur Blvd., B-56
Portland, OR 97219

Yes, Value-Soft, I want to SAVE $3 off the regular price of your 260-page *Black Book of C-128.* My payment of $14.95 ($12.95 for the reference guide and $2 for shipping and handling) is enclosed. I also understand that you're the people to call when I'm looking for that hard-to-find product. Thanks!

BLANK DISKETTE/10% OFF FROM CHIPMUNK

Mail to: Chipmunk Software
Box 463
631 North Cherry
Battle Ground, WA 98604

For faster service, call 800-331-3428,
or in Washington, call 206-687-2343.

Yes, Chipmunk, I want to take advantage of your great offer. Please rush my FREE BLANK DISKETTE. My order is enclosed. I also understand that if I order more than $19, I may take 10% OFF the price. Thanks!

10% OFF FROM CCOA

Mail to: Computer Centers of America
81 Terminal Drive
Plainview, NY 11803

For faster service, call 800-221-2760
or 800-631-1003. In New York,
call 800-548-0009.

Yes, CCOA, I want to SAVE 10% on my first order. My order is enclosed. Thanks!

FREE *GORTEX AND THE MICROCHIPS* TO FIRST 100 ABBY'S CUSTOMERS

Mail to: Abby's Discount Software
37 South Broad
Fairborn, OH 45324

For faster service, call 800-282-0333.
In Ohio, call 513-879-9699.

Yes, Abby's, I want my FREE PROGRAM, *Gortex and the Microchips.* My software order of $20 or more is enclosed. I understand that I'll receive this FREE PROGRAM only if I am one of the first 100 orders you receive. Thanks!

GREAT SAVINGS FROM ABACUS SOFTWARE

Mail to: Abacus Software
P.O. Box 7211
Grand Rapids, MI 49510

Yes, Abacus, I want to SAVE $5 on the purchase of one of your books and/or SAVE $10 on the purchase of one of your software packages. I understand this coupon is not valid towards the purchase of Optional Diskettes for Books. My order is enclosed. Thanks so much!

5 FREE DISKS FROM AICP

Mail to:
American International Computer Prods.
Box 1758
Staten Island, NY 10314

For faster service, call 800-634-AICP.
In New York, call 718-351-1864.

Yes, AICP, I want my 5 FREE DISKS. My order for two 10-packs of your disks is enclosed, as is my payment of $19.30 ($15.80 for the disks and $3.50 for shipping and handling). New York residents: Please add appropriate sales tax.

FREE MODEM FROM QUANTUM COMPUTER SERVICES

Mail to:
Quantum Computer Services Inc.
8620 Westwood Center Drive
Vienna, VA 22180

For faster service, call 800-392-8200
and ask for Dept. 25.

Yes, Quantum, I want to receive my FREE MODEM by paying now for 4 months of QuantumLink Basic Service ($9.95/month). My payment of $39.80 is enclosed. Thanks!

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Please allow 4 to 6 weeks for delivery.

FREE PAPER WITH PRINTER PURCHASE FROM WHITE HOUSE...

Whether you're in the market for Commodore or Commodore-compatible hardware or software, **White House Computer** is a name worth remembering. They sell computers, modems, drives, interfaces, diskettes, paper, monitors, printers and a variety of name-brand software at very competitive prices. Now and for a limited time, when you buy any printer from **White House**, you'll receive 250 sheets of printer paper ABSOLUTELY FREE! Their extensive selection of printers includes Okidata, Legend, Panasonic, Citizen, Star Micronics and Seikosha. For a complete listing of **White House**'s printers and other offerings, you'll find the **White House** ad in this month's issue of *Ahoy!* To order, all you have to do is clip the **White House** coupon on page 3 of this *Clipper,* and send it with your order. You may place your order by phoning 800-351-3442, or in Pennsylvania, by calling 717-322-7700. But don't forget to mention you saw this offer in the *Ahoy! Access Clipper.* For more details on the credit card surcharge and cost of shipping and handling, see the fine print in the **White House** ad. Don't wait. This FREE PAPER OFFER runs out on February 1, 1987.

The Ahoy! Access Clipper *is published bimonthly by* Ahoy! *magazine and sent free to selected subscribers of* Ahoy! Ahoy! *is a monthly publication of Ion International Inc. The cost of a one-year subscription is $21.95; two years are $41.75. Inquiries regarding subscriptions to the magazine should be addressed to Ion International Inc., 45 West 34th Street, Suite 407, New York, New York 10001.*

Ahoy!

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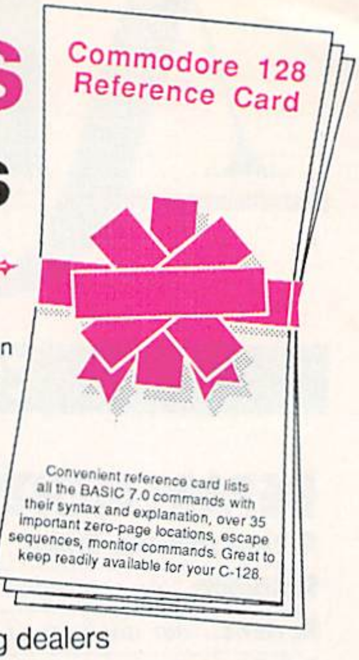
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Postmaster, send address changes to *Ahoy!*, 45 W. 34th Street, Suite 407, New York, NY 10001. Direct all address changes or matters concerning your subscription to *Ahoy!*, P.O. Box #341, Mt. Morris, IL 61054. All editorial inquiries and software and hardware to be reviewed should be sent to *Ahoy!*, 45 W. 34th St., Suite 407, New York, NY 10001.

Begin your Holidays

with a free gift* from Abacus

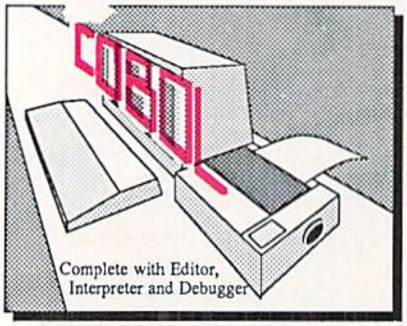


Simply fill out the attached coupon and return it to one of our participating dealers for your **free** Commodore 128™ Reference Card (Retail value $2.95). And while you're there, take a look at our complete line of top-notch software. No purchase necessary.

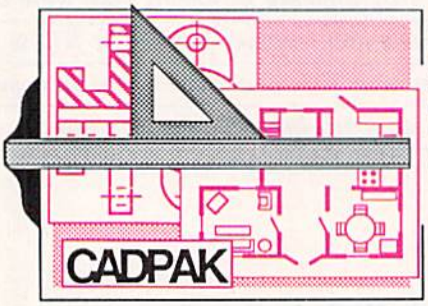
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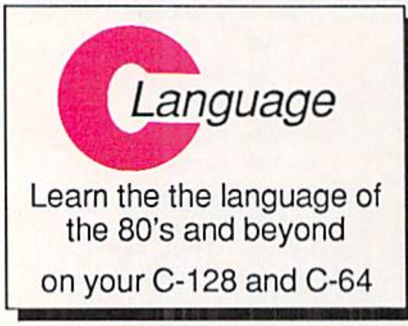
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Not just a compiler, but a complete system for developing applications in Pascal–with graphics. Extensive editor with search, replace, renumber, etc. Standard J & W compiler that generates machine code. High-speed disk access. 48K RAM is available. If you want to learn Pascal or to develop software using the best tools available–**Super Pascal** is your first choice. **C-64 $59.95**



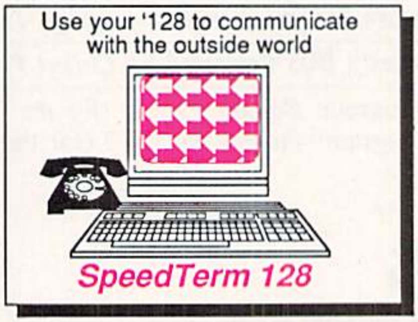
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Now you can learn COBOL, the most widely used commercial programming language, on your 128 or 64. COBOL Compiler package comes complete with syntax-checking editor, interpreter and symbolic debugging aids. New '128 version works with 40/80 column monitors and is quicker than the '64 version. **C-128 $59.95**
C-64 $39.95



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Easy-to-use interactive drawing package for accurate graphic designs. Dimensioning features to create exact scaled output to all major dot-matrix printers. Input via keyboard or lightpen. Two graphic screens for COPYing from one to the other. DRAW, BOX, ARC, ELLIPSE, etc. available. Define your own library of symbols/objects–store up to 104 separate objects. **C-128 $59.95**
C-64 $39.95



Super C Compiler
For school or software development. Learn the C language on the '64 or '128. Compiles into *fast* machine code. Added '128 features: CP/M-like operating system; 60K RAM disk. Combine M/L & C using CALL; 51K available for object code; Fast loading; Two standard I/O librarys plus math & graphic libraries. **C-128 $59.95**
C-64 $59.95



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Let your C-128 communicate with the outside world. Obtain information from various computer networks. Flexible, command driven terminal software package. Supports most modems for the C-128. Xmodem and Punter file transfer protocol. VT52 terminal emulation with cursor keys, large 45K capture buffer & user definable function keys. **C-128 $39.95**



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Complete BASIC compiler and development package. Speed up your programs 5x to 35x. Compile to machine code, compact p-code or both. '128 version: 40 or 80 col. monitor output and FAST-mode operation. '128 version includes extensive 80-page programer's guide. A great package that no software library should be without. **C-128 $59.95**
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Call now for the name of your nearest dealer. To order direct call **616/241-5510**. Add $4.00 per order for S&H. Foreign add $10.00 per item. Call or write for your **free catalog** of software and books. Dealer inquires welcome. 1500 dealers nationwide.

Abacus

P.O. Box 7219 Dept H1 Grand Rapids, MI 49510
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GOOD FOR ONE COMMODORE 128 REFERENCE CARD

One per customer. Good only while supplies last. This offer ends January 31, 1987.

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H1

GOOD FOR ONE COMMODORE 128 REFERENCE CARD

VIEW FROM THE BRIDGE

When Michael Schneider launched *Ahoy!* into the choppy waters of computer publishing in January 1984, he knew what the odds were against being in business a year later. He proceeded anyway, guided by two deeply held beliefs: one, that the computing public would support a magazine that consistently offered the best selection of programs and features in its market; and two, that the Commodore 64 would take over the world. And because *Ahoy!'s* publisher was right on both counts, this month we and our readers mark a special occasion together—the third anniversary of the premier of *Ahoy!*

One way we're celebrating is by going online with QuantumLink, the leading bulletin board service for Commodore users. *Ahoy!'s* regular BBS will be available to multiuser access on Q-Link, as it has been on PlayNET for the past year. Additionally, our editors and writers will host a monthly forum—check with Q-Link for dates and times.

The advertisement on the inside back cover of this issue will tell you how to receive a QuantumLink starter kit free when you subscribe to *Ahoy!* Or if you prefer, you can receive everything you need to get online with QuantumLink with this month's *Ahoy! Disk,* including a manual and all required software. Instructions on ordering the *Ahoy! Disk* can be found on page 79.

We hasten to add that we will continue to honor the similar offer for a PlayNET membership kit, extended last issue, through December 31, 1986.

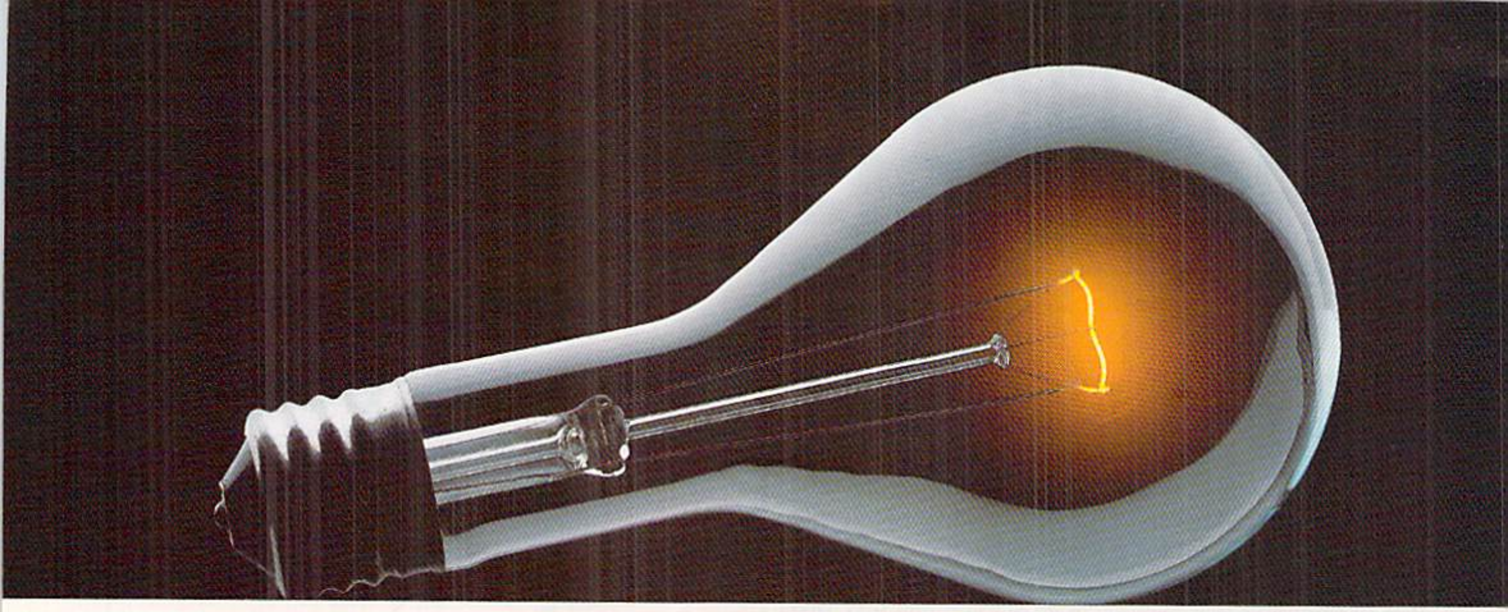
Among the special features in this third anniversary issue:

• In a tremendous show of programming power, Carlos de la Guardia has added 31 new commands to BASIC 2.0—and christened his upgrade *BASIC Ahoy!* We welcome future program submissions utilizing this versatile new language. (Turn to page 48.)

• Back in basic BASIC, Buck Childress continues to improve the quality of your programming life with *Perma-Line*, which will render program lines of your choice delete-proof. (Turn to page 78.)

• Senior Editor Tim Little has answered a need often expressed by our readers: for a utility that will LIST otherwise unLISTable programs. *Lixter* will print a disassembly, BASIC LIST, hex dump, or simple PETSCII dump (with control characters translated), without loading the program into memory. Let us know if you find any limitations on its effectiveness—we've been unable to! (Turn to page 98.)

• Cleve Blakemore's games continue to be not just entertaining in their own right, but an education in them-



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selves. This month's *Catacombs* is a study in the use of the 64's neglected extended background color mode. (Turn to page 89.) And *Dark Fortress* utilizes an ignored ability of the C-128: to accommodate a game designed for two separate screens, each controlled by one player and hidden from the other. (Turn to page 99.)

• Speaking of *Screens,* Marie E. Coon's program of the same name will allow C-64 programmers to write, store, and call up screens full of information in their BASIC or machine language programs. (Turn to page 82.)

• If you can no longer find a *Gyruss* game to eat your quarters, Sean Wagle's *Vortex* should provide a comparably dizzying outer space experience for just the price of electricity. (Turn to page 20.)

• *Hanger 14* is the danger-enmeshed destination of a robot who is searching for a hijacked cargo rocket. (Yes, we know that the type of hanger used to store aircraft is spelled with an "a" instead of an "e." But by the next century, many of the "a" 's in the lexicon will have been replaced by "e" 's. Or so claim our proofreaders who didn't catch the error until it was too late.) (Turn to page 23.)

• *Starfighter* can hardly claim originality of design among its merits, but the smoothness and quickness of its gameplay are sure to repay your keypunching efforts. (Turn to page 25.)

• Though he's been pulling rabbits out of the C-64 and C-128 for the entire three-year run of *Ahoy!*, Dale Rupert's column on *Basic Magic* describes a bit of prefabricated prestidigitation: the 128's built-in monitor. This month's *Rupert Report* reveals and analyzes this particular magician's secrets. (Turn to page 32.)

• In answer to your requests for more of the most detailed *Reviews* in the Commodore market, this month's section swells to four in number. Along with Morton Kevelson's searching, searing examination of the *1571 Clone Machine* and *Kracker Jax* copy utilities, Ted Salamone reports on *Gnome Kit* and the B.E.S.T. *Project Planner/Reporter.* (Turn to page 60.)

• In the months ahead, you can look to our *Entertainment Software Section* for reviews of 1987's best, worst, and most middling game releases. But for this month, let's look back at 1986, as Arnie Katz and the industry's most experienced game reviewers judge *The Year's Best Entertainment.* Also featured in this issue are full-length reviews of *Battlefront, The Financial Time Machine, Breakers,* the *Top Gunner Collection, The Never Ending Story,* and *Gettysburg: The Turning Point.* (Turn to page 41.)

You can look forward to a great deal more in the months ahead as well, including expanded Amiga coverage and new regular features addressing the most current needs of C-64 and 128 users. We hope you'll continue to write, call, or visit to tell us how we can make your favorite Commodore magazine better. Then maybe by the time we reach our fourth anniversary, we can start taking it a little easier. (Only joking. Before Michael Schneider allowed that to happen, he'd launch us into the choppy waters mentioned above!) *—David Allikas*

SCUTTLEBUTT

BIBLE PROGRAMS • MODULA-2 FOR AMIGA • ACCOUNTING PROGRAMS • IBM TO COMMODORE CONVERTOR • SPEECH SYNTHESIZER SOFTWARE • DISK CATALOGER • COLLEGE DATABASE • GAMES FROM ACCOLADE, CHIPMUNK, ACTIVISION, EA, SSI • CHRISTMAS MUSIC • SOUND SAMPLER • PLUS/4 CONVERSIONS • BOOKS

GAME RELEASES

GBA Championship Basketball: Two-on-Two has been adapted for the Amiga, presumably with enhanced graphics and sound.

Gamestar, 415-960-0410 (see address list, page 14).

Activision will release *Howard the Duck: Adventure on Volcano Island* (a decision clearly reached before movie reviewers across the country shot the fowl from the sky).

Derived from the ancient oriental game of Mah Jongg, *Shanghai* consists of 144 tiles in seven suits, stacked in a five-level dragon-shaped pyramid. Tiles are removed in pairs until none remain or no additional moves can be made. Options include solitaire play, head-to-head matches against the clock, and multiplayer tournaments. Price is $34.95 for the C-64 version, $44.95 for the Amiga. A demo disk is available from Activision for $3.00.

Activision, 415-960-0410 (see address list, page 14).

Two C-64 games from Electronic Arts:

Marble Madness ($29.95), while several notches below the must-see-to-believe Amiga version, offers similar graphics and gameplay, plus a new Secret Level. Each of the six playfield raceways has its own "personality" and set of obstacles and creatures to contend with.

A combination card game and computer game, *Robot Rascals* ($39.95) sends two to four players on a scavenger hunt. Onscreen robots travel into forests, mountains, and swamps to locate items represented to cards players draw, such as the Digital Donut and the Transistor Taco.

Electronic Arts, 415-571-7171 (see address list, page 14).



Dan Bunten and Alan Watson, proud papas of EA's **Robot Rascals**, *a hybrid computer/card game centering around an onscreen scavenger hunt. READER SERVICE NO. 130*

For the C-128 in – get this – *C-128* mode, *The Great War* ($29.95) lets one or two players maneuver more than 400 corps/division sized units representing the armies of 17 countries over a map of 1914 Europe. The two-player version spans the entire war from 1914-18 in two-week turns, taking over 100 hours to complete.

Free Spirit Software, Inc., 312-352-7323 (see address list, page 14).

Like the board game of the same name, *Dr. Ruth's Computer Game of Good Sex* ($29.95) requires 1 to 7 players to answer questions about love, relationships, and sex. Correct answers score points and let players advance to the bonus round called the Sexual Clinic, where they hear actual case histories as told to Dr. Ruth and select the correct response from four choices. Over 800 questions are included.

The Avalon Hill Game Company, 301-254-5300 (see address list, page 14).

Pirate ($5.99) requires the player to find the answers to five questions hidden on the disk within the tracks and sectors, using sector editors, ML monitors, and anything else he thinks will help. For a limited time, a copy of *Aerospace Trivia* will be sent free upon verification of correct answers.

Brian Shine Software, 818-915-4095 (see address list, page 14).

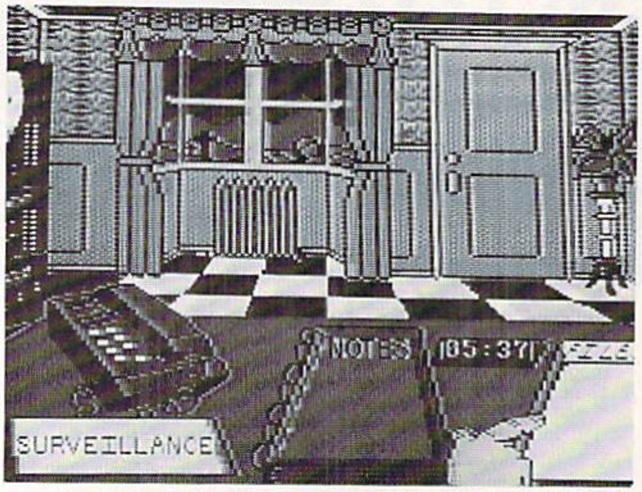
An animated game show for the C-64, *Fun Wheel* includes a Puzzle Maker program with review and editing capabilities. Special price for *Ahoy!* readers is $8.00 postpaid.

Data Heaven (see address list, page 14).

The *1985 Baseball Data Disk* and *Computer Quarterback 85 Data Disk* are available for use with SSI's C-64 sports contests, containing stats for all 1985 teams and a stat compiler for recording performance statistics of games played. Price is $15.00 each.

Strategic Simulations, Inc., 415-964-1353 (see address list, page 14).

Bridgebrain, a contract bridge simulation for the 64, lets the player choose from five options: to play random deals as the declarer, to play a complete simulation of contract bridge in which he bids and plays each deal as South, to enter a deal manually, to enter a deal number to generate a deal, and a two-player option in which one player is North/South and the other East/West, with the program playing partner for both. Bidding is in accordance with the



Reminiscent of an Agatha Christie drama, **Killed Until Dead** *features over 20 plots and an unusual challenge: to prevent a murder, not solve one. READER SERVICE NO. 138*

Standard American System, and is directed toward making game unless a slam seems possible. Price is $40 for tape or disk.

George Bodnar (see address list, page 14).

An interactive text and graphics murder mystery, *Killed Until Dead* ($29.95) features five characters, one of whom attempts the perfect murder. The player becomes Hercule Holmes, the master sleuth who must solve the mystery before the murder hour of midnight. Operating from his desk, Holmes accesses information in three ways: via character profiles, a video-telephone, and a surveillance machine. While collecting clues, notes are logged in the detective journal, from which they can be accessed at any time.

Accolade Inc., 408-446-5757 (see address list, page 14).

Pilgrim's Progress ($29.95), a C-64 text adventure utilizing a sophisticated parser and occupying an entire side of a disk, requires about 80 hours to complete but is simple enough to be enjoyed by beginners (just like the classic tale upon which it is based).

Chipmunk Software, 1-800-331-3428 (see address list, page 14).

C-128 ACCOUNTING

Cash In-Cash Out ($69.95), an accounting system for the C-128, records sales and expenses when checks are actually written or received (cash basis method) rather than when sales are ordered or expenses incurred (accrual method). Included are a Customizing Module (tailor information like tax rates, expense accounts, and payroll deductions), Sales Module (tracks up to nine categories), Disbursement Module (handles up to 200 accounts and produces two separate expense reports), Payroll Module (includes federal tax tables for up to 75 employees, four changing tax rates, seven special deductions, and facilities for printing payroll checks), Financial Reports Module (produces quarterly, yearly, or interim reports), Graphics Module (graphs any or all sales and disbursements on screen or printer). and Financial Tool Box (including break even analysis, depreciation, amortization, mortgage compensation, and more.)

Microsphere Corporation, 1-800-521-2488; in PA call collect 412-838-1166 (see address list, page 14).

THINKING CAP

Thinking Cap ($49.95) automatically organizes thoughts into outline format. The user preparing a report, speech, proposal, or other document specifies up to seven levels of information, with sixteen subtopics in each level, then enters details randomly under the appropriate headings. The program will create the numbering format for an outline up to six pages long. Four different format options are included: Roman numerals and prose, technical and numeric. Words can be underlined or printed in boldface.

Broderbund Software, 415-479-1700 (see address list, page 14).

DELUXE VIDEO USER'S GUIDE

For use with Electronic Arts' desk-

top video program, *The Deluxe Video Advanced User's Guide* provides 70 pages of techniques and tips, including step-by-step tutorials on making animatics, commercials, presentations, and interactive videos. The booklet will be sent free to *Deluxe-Video* owners who send in the product registration card included in the package.

Electronic Arts, 415-571-7171 (see address list, page 14).

DISK CATALOGER

The newly enhanced *SuperCat Disk Cataloging System* ($29.95) will now allow two-drive users to double the program's original capacity to a maximum of 1280 disk directories, or 10,000 titles. Additionally, new ML routines provide fast sorts (1000 titles in eight seconds) and eliminate garbage collection delays. Automatic title entry and cross-reference capabilities are provided for. Multicolumn reports (output to printer or screen) provide listings by disk and program title. For the C-64 and one or two drives; backup copy included.

Cornucopia Software, 503-284-8557 (see address list, page 14).

PLUS/4 SOFTWARE

Chipmunk Software has adapted the following C-64 programs to the Plus/4:

Disk Tracker allows the user to display any directory onscreen and store up to 1800 directories on a single disk. Price is $19.95.

Check Tracker ($24.95), designed to manage a simple banking account or double entry bookkeeping system, can manage T accounts and the budgeting of up to 600 checks per month. An entire year's records can be stored on a single disk.

Address Checker ($19.95), a dedicated filing system for names and addresses, prints mailing labels and holds up to 1220 records on a single disk. This surpasses the filing system built into the Plus/4 – as hard as that is to believe.

Also scheduled for conversion are *Bible Trivia* and *Adventure Pac,* which will consist of at least six

games.

An unconditional warranty extending from now until the end of time is included with all Chipmunk products. A free catalog of C-64 and Plus/4 products is available on request.

Chipmunk Software, 1-800-331-3428; in WA 687-2343 (see address list, page 14).

COLLEGE KNOWLEDGE

The Perfect College ($34.95) lets high school students research 1650 four-year colleges and universities in five areas: Basics (location, size, setting, cost, etc.), Competitiveness (test scores, GPA, percentage accepted, and overall), Academics, Student Life, and Admissions. Using the program will also teach students how to operate a database. A backup disk and user's guide are included.

Mindscape's entire product line is profiled in their free 20-page fall catalog, featuring a Word-Find contest open to all educators and offering prizes of up to $500 worth of software.

Mindscape Inc., 1-800-221-9884; in IL 1-800-942-7315 (see address list, page 14).

512K FOR AMIGA

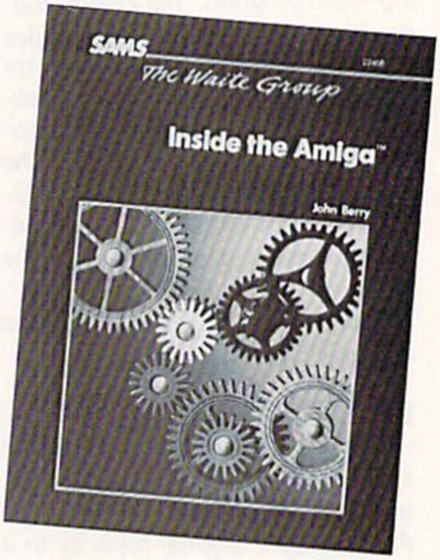
Alegra adds 512K to the Amiga while boasting the smallest footprint (4"x9"x¾") and lowest price ($379) of any Amiga memory expander. Use of semi-custom logic and a unique printed circuit design allows for future expansion to 2MB by replacing memory and configuration devices. The current unit supports the Amiga's autoconfiguration architecture, with power (less than five watts) supplied by the computer at the expansion connector.

Access Associates, 408-727-0256 (see address list, page 14).

AMIGA BBS

The North American Amiga Users Group (NAAUG) has established a 24-hour BBS, The LifeSaver, to provide a central point for the collection and distribution of public domain and user-supported Amiga software, as well as a place for users to share problems, ideas, and tips and to buy and sell equipment. Annual group membership is $25, which includes a subscription to the club's AmigaHelp newsletter, a disk of public domain software, free classified ads, and participation in a buying co-op. Limited access to the board will be granted to non-members. The board's number is 814-339-6042.

NAAUG, 814-237-5511 after 4 p.m. (see address list, page 14).



For advanced C language programmers.
READER SERVICE NO. 135

FREE SHOPPING TIME

CompuServe will offer free connect time at specified periods during this holiday season for shopping in their Electronic Mail. Additionally, $5 worth of connect time credit will be granted for every purchase of $50 or more in a single day.

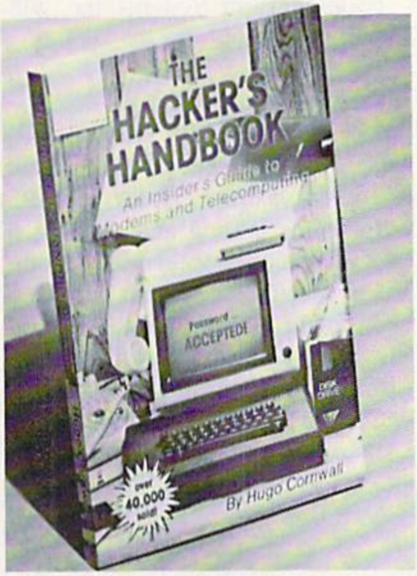
CompuServe, 614-457-8600 (see address list, page 14).

BOOKS

Two tomes from Abacus:

GEOS–Inside and Out ($19.95) includes introductory material about *GEOS,* the *Desktop, GEOWRITE* and *GEOPAINT,* a large selection of tricks and tips, and material on program internals, as well as corrections of some problems found in the early release of *GEOS.*

BASIC 7.0 Internals ($24.95), a



You too can be wanted by the FBI.
READER SERVICE NO. 136

companion volume and follow-up to *C-128 Internals,* offers 600 pages of coverage of the BASIC 7.0 interpreter.

Abacus Software, 616-241-5510 (see address list, page 14).

Inside the Amiga ($22.95), written for the experienced computer user who wants to use the C language to tap the Amiga's powerful programming features, reviews the language itself and covers Amiga data structures, interrupt handling, playfield graphics, animation, libraries and devices, and the computer's sound system.

Howard W. Sams & Co., 1-800-428-SAMS (see address list, page 14).

Two releases from TAB Books:

1001 Things to Do with Your Amiga details such uses as household record-keeping and budgeting, investment analysis, business management, game playing, and scientific and educational utilization. A selection of programs is included. Price of the 208-page paperback is $12.95; with disk $32.95.

Commodore 128 BASIC: Programming Techniques ($12.95 paperback, $18.95 hardbound) runs through a variety of commands and techniques in storing and retrieving data, telephone communications, programming sound and graphics, and more. Over 50 type-in programs are included.

TAB Books Inc., 717-794-2191 (see address list, page 14).

The following from E. Arthur Brown Company:

The expanded second edition of *The Hacker's Handbook* ($12.95) goes into detail on how these individuals break into computer systems, covering everything from breaking passwords to short wave radio hacking. Purely an expose, you understand.

Free for the asking, *The Computer Hobbyist Catalog* offers software and hardware for the C-64 and assorted other computers.

E. Arthur Brown Company, 612-762-8847 (see address list, page 14).

TAX MASTER UPDATE

The 1986 version of *Tax Master* for the C-64 ($30.00) guides the user through the preparation of Forms 1040 and 4562 (Depreciation) and Schedules A (Itemized Deductions), B (Interest and Dividends), C (Small Business), D (Capital Gain/Loss), E (Rent/Royalty Income/Loss), and F (Farm Income/Loss). The program

includes all tax tables, figures tax automatically, and performs all calculations. A file coding system allows data for multiple taxpayers to be stored on one disk. A built-in calculator function can be accessed at any point in the program. Included is a coupon good for a substantial discount on next year's version.

Master Software, 301-922-2962 (see address list, below).

BIG BLUE TO BIG C

Particularly useful for persons who use IBM equipment at work and a C-128 at home, *The Big Blue Reader* ($29.95) allows C-128 owners to transfer word processing and ASCII files generated on most IBM-compatible software to Commodore DOS files (at 12,000 bytes per minute), and vice versa (at 20,000 bytes per minute). The user is offered the option of translating MS DOS standard ASCII to Commodore ASCII and vice versa, avoiding the problems of reversed capitals and lowercase letters that usually result from ASCII transfers between the formats.

S.O.G.W.A.P. Software, Inc., 213-822-1138 (see address list, below).

MODULA-2 FOR AMIGA

Pecan Software is distributing the Modula-2 language for use on the Amiga, along with a forthcoming series of developmental tools. Because of the language's modularity, Pecan deems it well-suited to large-scale software development, as well as an excellent alternative to the C language. Price is $79.95.

Pecan Software Systems, Inc., 718-851-3100 (see address list, below).

VOICE MASTER EDITOR

Designed for use with Covox's Voice Master speech synthesizer, *Speech Construction Set* ($49.95) permits the editing and refining of digitally encoded speech in software. Via hi-res graphic screens and a "cut and paste" process, the 64 user modifies the elements of the sonic waveform which constitutes the speech.

Covox, 503-342-1271 (see address

Continued on page 145

Companies Mentioned in *Scuttlebutt*

Abacus Software
P.O. Box 7219
Grand Rapids, MI 49510
Phone: 616-241-5510

Access Associates
491 Aldo Avenue
Santa Clara, CA 95054
Phone: 408-727-0256

Accolade
20833 Stevens Creek Blvd.
Cupertino, CA 95014
Phone: 408-446-5757

Activision, Inc.
2350 Bayshore Parkway
Mountain View, CA 94043
Phone: 415-960-0410

The Avalon Hill Game Co.
Microcomputer Games Div.
4517 Harford Road
Baltimore, MD 21214
Phone: 301-254-9200

Batteries Included
30 Mural Street
Richmond Hill, Ontario
L4B 1B5 Canada
Phone: 416-881-9941

Brian Shine Software
1410 N. Grand Ave. #C
Covina, CA 91724
Phone: 818-915-4095

Broderbund Software, Inc.
17 Paul Drive
San Rafael, CA 94903-2101
Phone: 415-479-1170

Chipmunk Software
Box 463
Battleground, WA 98604
Phone: 1-800-331-3428

CompuServe
5000 Arlington Centre Blvd.
Columbus, OH 43220
Phone: 614-457-8600

Cornucopia Software
P.O. Box 2638
Portland, OR 97208-2638
Phone: 503-284-8557

Covox, Inc.
675-D Conger St.
Eugene, OR 97402
Phone: 503-342-1271

Data Heaven
6118 S. Briar Bayou
Houston, TX 77072

Digital Engineering and Design
2718 S.W. Kelly, Suite C165
Portland, OR 97201
Phone: 503-245-1503

E. Arthur Brown Company
3404 Pawnee Drive
Alexandria, MN 56308
Phone: 612-762-8847

Electronic Arts
1820 Gateway Drive
San Mateo, CA 94404
Phone: 415-571-7171

Free Spirit Software, Inc.
538 S. Edgewood
LaGrange, IL 60525
Phone: 312-352-7323

Gamestar, Inc.
(See **Activision**)

George Bodnar
1134 Harvard Cr.
Pittsburgh, PA 15212

Great American Software
Box 910
Amherst, NH 03031
Phone: 1-800-528-5015
or 603-889-5400

Howard W. Sams & Co.
4300 W. 62nd Street
Indianapolis, IN 46268
Phone: 317-298-5400

John 1:1 Graphics
P.O. Box 316
Bellflower, CA 90706
Phone: 213-422-5307 (modem)

Kledzik Company
25605 Cielo Court
Valencia, CA 91355
Phone: 805-254-4729

Kyan Software, Inc.
1850 Union Street, #183
San Francisco, CA 94123
Phone: 415-626-2080

Master Software
6 Hillery Court
Randallstown, MD 21133
Phone: 301-922-2962

Microsphere Corporation
Plymouth Center
521 Plymouth Street
Greensburg, PA 15601
Phone: 1-800-521-2488; in PA call collect 412-838-1166

Mindscape, Inc.
3444 Dundee Road
Northbrook, IL 60062
Phone: 312-480-7667

NAAUG
Box 376
Lemont, PA 16851
Phone: 814-237-5511 (4-9)

Pecan Software Systems
1410 39th Street
Brooklyn, NY 11218
Phone: 718-851-3100

Scriptural Software Unltd.
2613 Via Vera
Carlsbad, CA 92008
Phone: 619-434-2121

Softsync, Inc.
162 Madison Avenue
New York, NY 10016
Phone: 212-685-2080

S.O.G.W.A.P. Software
611 Boccaccio Avenue
Venice, CA 90291
Phone: 213-822-1138

Springboard Software, Inc.
7808 Creekridge Circle
Minneapolis, MN 55435

Strategic Simulations, Inc.
1046 N. Rengstorff Avenue
Mountain View, CA 94043
Phone: 415-964-1353

TAB Books Inc.
Blue Ridge Summit, PA 17214
Phone: 717-794-2191

SCIENTISTS
DISCOVER NE

When we started our company on the west coast, people thought we were a little spaced out. So you can imagine their reactions when we announced we'd discovered a new universe.

People laughed. People scoffed. And they really freaked out when we told them where we'd found it:

Inside a Commodore 64.

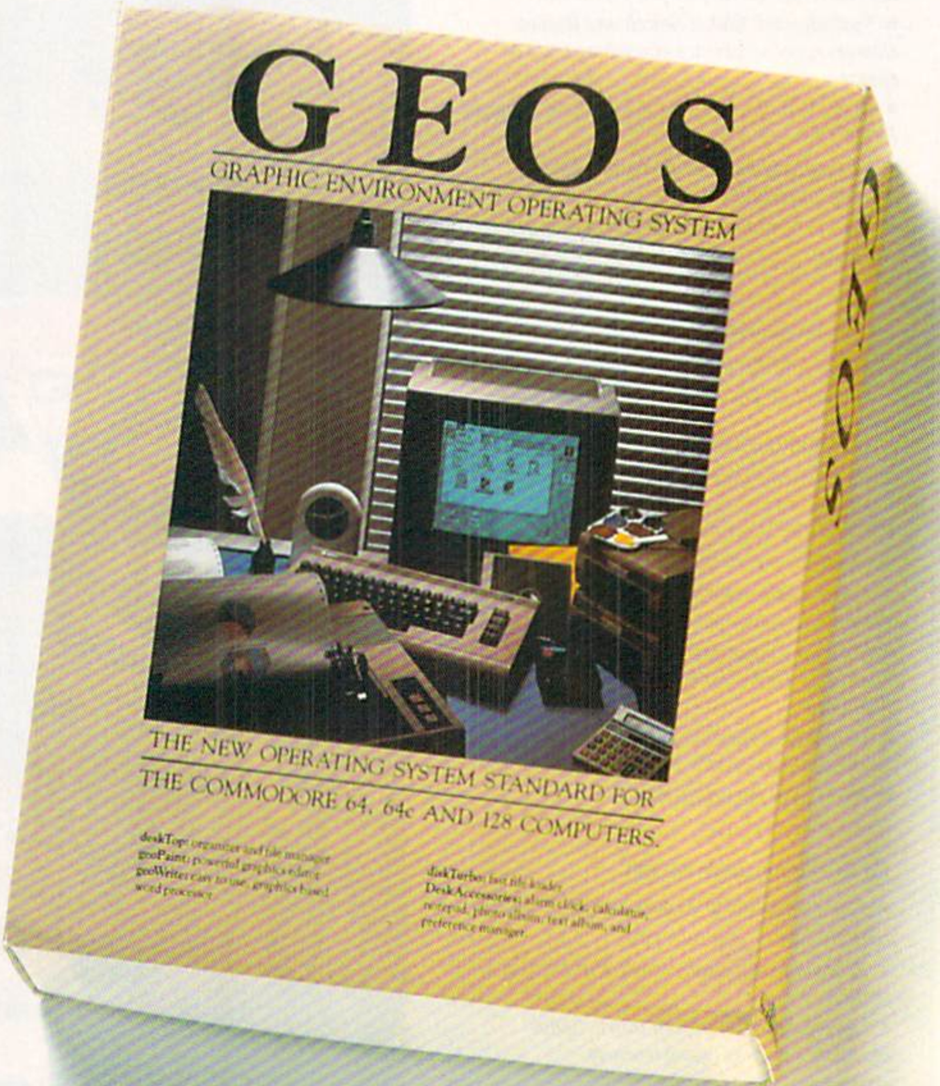
It's called GEOS. And it turns any Commodore into a powerful PC that holds its own against any computer, no matter what kind of fruit it was named after.

GEOS: The superior intelligence. Of course, we always knew Commodores possessed superior brains. It just took GEOS to discover them.

You see, GEOS opens your Commodore to a huge universe that can hold an infinite number of applications. Which means that GEOS can do just about anything the expensive PC's can do, including one thing they can't:

Add even more GEOS applications that are being developed even as you read this.

Increase your speed to warp factor 7. The first thing you notice with GEOS is how its diskTurbo speeds up your Commodore's disk loading and storing time.



Not twice or three times as fast. But five to seven times faster than normal. Which lets you streak through files and documents at what seems like warp speed.

And that saves you endless time.

Every universe comes complete with a desk. The way to keep order in our universe is with the GEOS Desktop. It's just like your desk at home, only without the coffee stains.

The Desktop keeps your art and documents filed, and comes

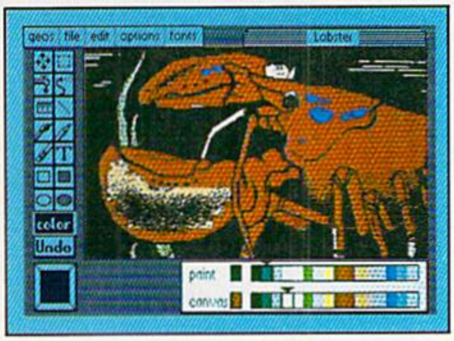
AT BERKELEY
EW UNIVERSE.

with all the accessories you need to keep you organized:

An alarm clock keeps you punctual. A notepad keeps your memos. And a calculator keeps your accountant honest.

How to communicate with a new universe. With geoWrite, you can rearrange your written words. Move blocks of copy. Cut and paste. And even display your text in fonts of different styles and sizes, right on the screen.

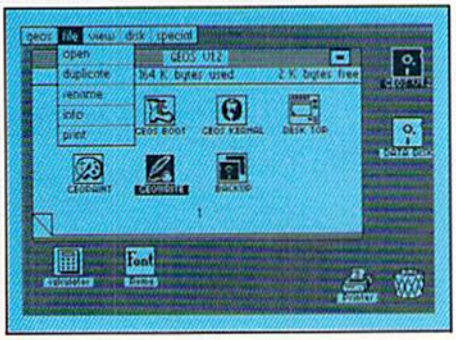
With geoPaint, you become a Michelangelo with a mouse.



Sketching and painting with all kinds of colors, textures and patterns.

You can invert, mirror and rotate images. Insert them into your geoWrite documents. And save them in your GEOS Photo Album for use later.

Finding your way through the universe. The most difficult



thing about a new universe is finding your way around. But with GEOS, you only need to remember two things:

Point and click.

When GEOS offers you options, you just point to your answers and click your mouse or joystick.

You want to draw? Point and click.

You want to write? Point and click.

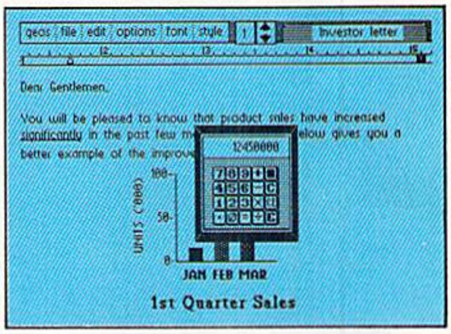
You want to fill in that obtuse rhomboid with an air-brushed geometric pattern in a lighter shade of pink? Point and click.

Easy, huh? And in case you ever do make a mistake, GEOS backs you up with an "Undo" feature that undoes the very last command you entered.

Running out of space. With GEOS, that's hardly likely. Because there's endless space in the universe for new applications.

Unfortunately, there's only so much space in this ad.

So zip down to your nearest software dealer. Tell him you want to explore the new universe in your Commodore.



And if he looks at you like you're some kind of alien, well, just tell him Berkeley Softworks sent you.

The name is universally known.

To order, call 1-800-443-0100 ext. 234
GEOS is just $59.95
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Reader Service No. 102

Berkeley Softworks

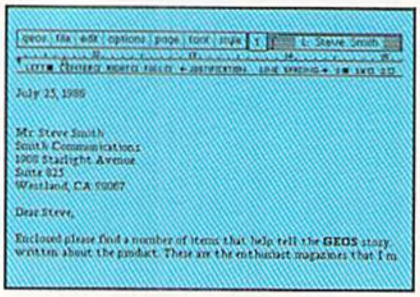
The brightest minds are working at Berkeley.

THE STRON
ARE BUILT WIT

Whether you're building an argument or just hammering out a memo, any project looks better when you put it together in Writer's Workshop. The supercharger that powers your GEOS-equipped Commodore through even the most wrenching assignments.

Sharpen your skills. The first thing to do in the Workshop is plug into geoWrite 2.0, which contains all the brand new tools you need to hone any rough concept into a well-crafted document.

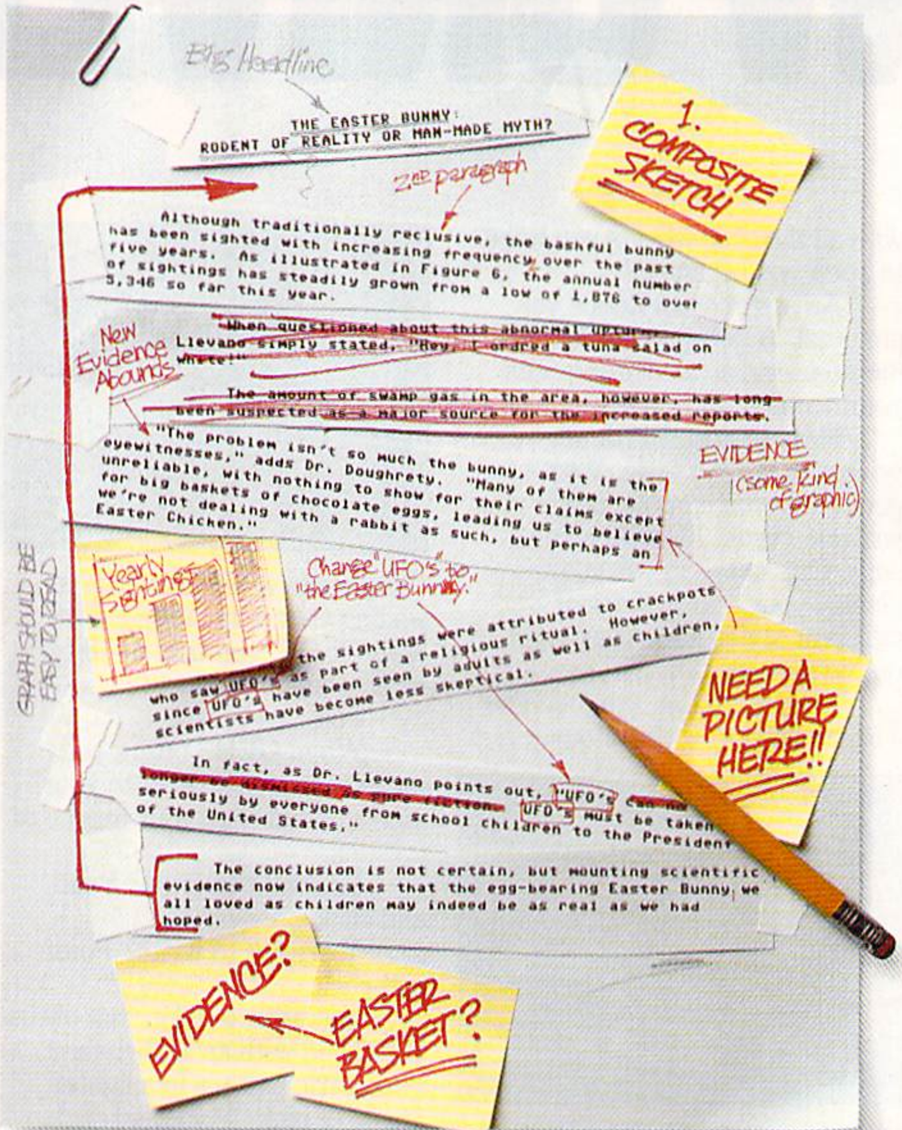
You get headers. Footers. Subscripts and superscripts. You can center your text. Right justify. Full justify. And nail



down formatting problems with variable vertical spacing and adjustable margins.

The Workshop cuts down on your manual labor, too. With one-stroke, "shortcut" keyboard commands. They keep your hands off the mouse so you can keep your mind on your work.

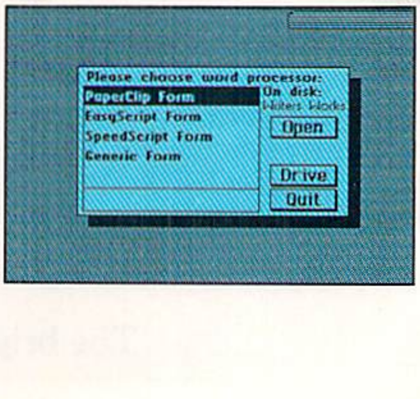
In fact, there's a complete set of heavy-duty accessories that not only strengthen your writing, but reinforce its structure, as well.



Replace old, worn-out parts. You can build anything with Writer's Workshop. And repair old stuff, too. Just decide which parts have to come out and which new ones go in.

Then hit the key and stand back.

Instantly, the "search and replace" drills through your old



GEST CASES
A WORKSHOP.



THE EASTER BUNNY:
Rodent of Reality or Man-Made Myth?

The conclusion is not certain, but mounting scientific evidence now indicates that the egg-bearing Easter Bunny[1] we all loved as children may indeed be as real as we had hoped.

Although traditionally reclusive, the bashful bunny has been sighted with increasing frequency, over the past five years. As illustrated in Figure 6, the annual number of sightings has steadily grown from a low of 1,876 in 1982 to over 5,346 so far this year.

1. The Easter Bunny, depicted by composite sketch.

Figure 6: Increased sightings, 1982 to present.

"The problem isn't so much the bunny, as it is the eyewitnesses," adds Dr. Dougherty. "Many of them are unreliable, with nothing to show for their claims except for big baskets of chocolate eggs[3], leading us to beleieve we're not dealing with a rabbit as such, but perhaps an Easter Chicken."

At first, the sightings were attributed to crackpots who saw The Easter Bunny as part of a religious ritual. However, since The Easter Bunny has been seen by adults as well as children, scientists have become less skeptical.

In fact, as Dr. Llevano points out, "The Easter Bunny must be taken seriously by everyone from school children to the President of the United States."

Figure 4: Evidence submitted by Dr. Dougherty.

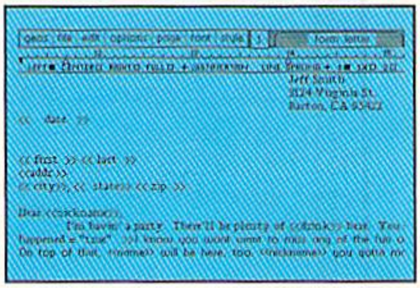
text, replacing worn-out words and phrases with your brand new ones.

For more serious cases, hand the job over to the Workshop's Text Grabber. It takes text from several word processors—like Paper Clip™—and lets you overhaul them with new GEOS fonts, formats and graphics.

A few more built-in features. Every project leaves the Workshop looking beautifully finished, too. Because it not only comes with LaserWriting compatibility, there's even a LaserWriter for you to print on.

You simply upload your files to QuantumLink.™ Then they're printed and mailed back.

Convenient, or what?



Of course, you don't want to keep good-looking documents like this to yourself. So we built in geoMerge. Which customizes your geoWrite form letters to people on your mailing lists.

So if your plans call for some real masterpieces, do something really constructive about it. Call your software dealer and requisition Writer's Workshop.

Who knows? You just might build a name for your self.

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WRITER'S WORKSHOP



Berkeley Softworks

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Reader Service No. 297

VORTEX

For the C-64

By Sean Wagle

The Vortex is a projection of another universe into our own, surrounded by protective tiles. Alien creatures spiral out of it from a reverse vortex in their own universe. The task of the game player is to avoid the aliens, get through the tile barriers, and close this "gap" in space.

Enter *Vortex* (page 134) using *Ahoy!'s Flankspeed* machine language entry program (page 111). To run *Vortex,* type SYS 49152. After a short pause (drawing sprites, setting up data tables), the title screen will appear. Select a skill level and begin by pressing f1 or f3.

Your ship will appear at the bottom left corner, traveling left. Joystick left rotates the ship counterclockwise; joystick right rotates it clockwise. The fire button releases a missile in the direction the ship is facing. Holding the fire button stops the ship's motion. When the button is released, the ship resumes moving. (Notice that the ship can still rotate while stopped.) The ship can scroll around the screen from any side and reappear on the opposite side.

The Vortex is the flashing dot in the center of the screen. The object of the game is to shoot through the tiles that protect it and hit the Vortex itself. On the novice skill level, each shot can remove a tile. On the expert level, the strength of the tiles and Vortex is increased and it takes many more hits to complete the mission.

The aliens can be shot, but that will only send an alien back into the Vortex. Because the Vortex is one-way, the alien must come back out again. This means that when an alien is hit while it is attempting to leave the Vortex, it is simply held at bay while the Vortex is protected. For this reason, the Vortex must be hit when no aliens are emerging from it.

You lose one of your three ships if it hits an alien, or if it runs into the tiles. Lose all three and the game ends.

There are 18 levels in *Vortex*. When the Vortex is destroyed, the player is given a new Vortex of a different color with faster aliens, as well as different sound effects for a hit on a tile. When the 18th Vortex is destroyed, the game cycles back to level one. At first this may seem difficult, but I have done it even on expert level.

The best strategy is to protect your ship, and fire at the Vortex only when opportune. Be ready to move when the aliens get too close. It is easy to let one's attention become too concentrated on the Vortex, when the real danger is from the aliens circling in from behind. Also, be aware that the aliens, like yourself, can scroll around the screen, so trying to "hide" offscreen or on a border is not necessarily safer than fighting in the open.

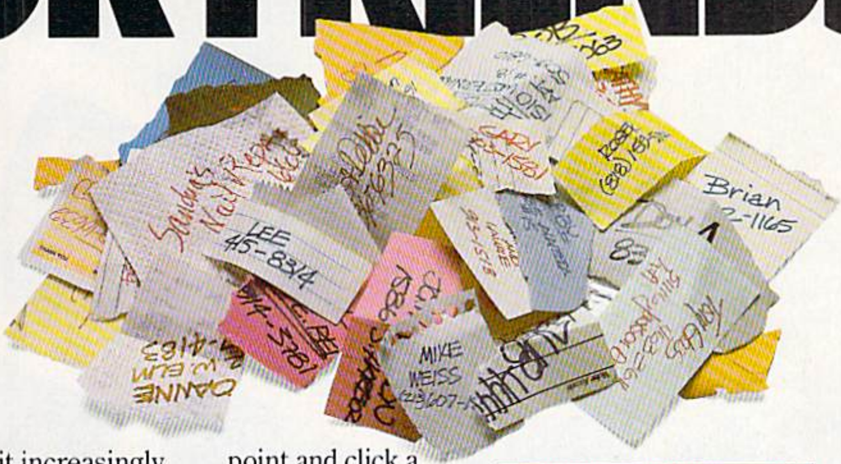
Scoring is as follows:

	Novice	Expert
Alien	1 point	1 point
Tile	10 points	10 points
Vortex	10 points	10 points
Completed level	100 x level	200 x level

These keys have the following functions:
f1=Begin game (Novice)
f3=Begin game (Expert)
LOCK=Pause game

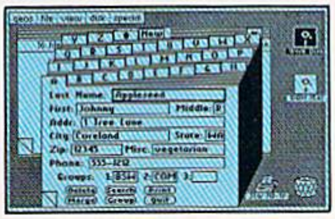
When f1 or f3 is pressed with CTRL or SHIFT, the rotation of the ship alternates between fast or slow for the next game. □*SEE PROGRAM LISTING ON PAGE 134*

ARE YOU SEARCHING FOR FRIENDS?



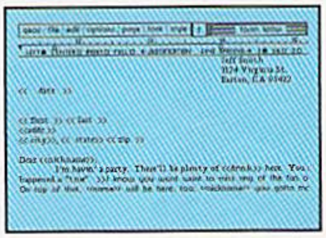
If you're finding it increasingly difficult to find anything at all, maybe it's time you found out about geoDex. The GEOS-compatible directory that generates mailing lists. Prints address labels. And sorts out all sorts of things for your Commodore.

Try directory assistance. With a little help from geoDex, you can call up a directory organized from any three categories you choose. Which means you can list your friends by name, telephone number or almost anything else that can be assigned its own three-character code.



Like "MEN" for guys you know. Or "GRL" for girls you know. Or "FOX" for girls or guys you'd like to know.

But no matter how you choose to categorize them, if you can point and click a mouse, you can call up any list of friends with geoDex's easy-to-read graphics.



Our most inviting feature. Of course, once you've gotten your friends organized, the next thing we recommend you do with geoDex is really very simple.

Throw a party.

You see, geoDex comes with geoMerge, a mail merge program that customizes form letters, announcements—even party invitations—with the names and addresses stored in geoDex. First you write the letter with geoWrite. Then you select a list from geoDex.

Put them both together with geoMerge and it's toga time!

The search is over. So if you're tired of looking for friends, waltz right down to your software dealer and ask him for geoDex. We can't guarantee it'll win you more friends, but it'll certainly keep you from losing them.

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geoDex $39.95

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GEODEX GEOS COMPATIBLE



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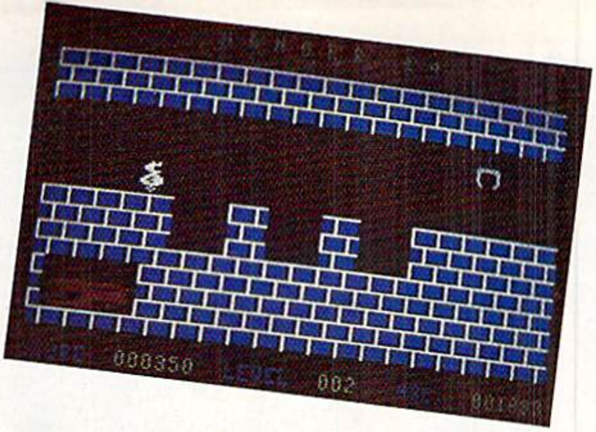
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HANGER 14

For the C-64

By Justin Luton



The Greater Andromeda Tea Biscuit Company finally traced its hijacked cargo rocket to a nearly deserted spaceport on the planet Metallion. The planet's name is derived from the many different colored metals of which it is formed. It is because of the planet's metallic composition that you, a robot, have been sent to retrieve the rocket from its hiding place in Hanger 14—for reasons I'll describe below.

The game is played with a joystick plugged into Port 2. The joystick movements are self-explanatory: move right or left to go in either direction, and push the fire button to jump. To make the robot jump in a certain direction, point the joystick in that direction and press the button.

There are seven consecutive levels of play, each level harder than the previous one. At the end of each level is a device that will magnetize your robot. This is necessary because of the many craters in the metal floor. While your robot does not have the ability to jump the entire width of the crater, when he is magnetized he can go a little bit over the edge without falling. But be careful not to go too far over the edge, because the magnetic hold will weaken and your robot will fall to his doom.

In addition to the pits, the hijackers have left various other obstacles in your way, but I will let you discover them for yourself.

The game is written completely in BASIC. It contains a few multicolor and redefined characters, as well as five sprites. ☐ ***SEE PROGRAM LISTING ON PAGE 119***

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with

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- 160 functions at your fingertips

Sixth Sense 128

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- Runs in 80 columns only

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The Kernal

Hot out of the programmer's hands…the Kernal available now for Commodore 64s!

Commodore users can now use the SUPERDOS fastloader, the DOS wedge and enjoy a built-in freeze/exit function for the first time. Experience the ultimate!

The Kernal is 100% Commodore compatible with easy access! It includes a SUPERDOS fastloader in mode files that's 15 times faster than normal. The Kernal's DOS wedge disables wedge commands and drive rattle. Its un-new function restores basic program after a new command.

The amazing freeze function allows exit to basic and then a return. Imagine a hardware reset that doesn't destroy data. The Kernal even loads ML or binary programs from the disk. All of this and more happens when you use the Kernal!

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version 2.0 by Marty Franz & Joe Peter

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SUPER NIBBLER - The most powerful nibble available. It even detects and duplicates density changes automatically.

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SUPER DOS FAST LOADER - Loads 150 blocks in 10 seconds. It also includes an Auto-Boot maker.

All programs work with 1541/1571 single side drives made. All of the copiers are the fastest on the market and include directory options. The File Copier, Track & Sector Editor, Super Nibbler and Disk Surgeon use 1 or 2 drives and include device number change. All programs re-boot to main menu. SUPERKIT has an easy to use menu-driven operation! Version updates are $10. Parameter updates are $6.

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SUPERKIT 1541 is for archival use only! We do not condone nor encourage piracy of any kind.

STARFIGHTER

For the C-64

By Mike Carston



S*tarfighter* is a simple yet enjoyable game to play. It has multicolor sprites, hi-res graphics, sound effects, and machine language subroutines for faster play. It also has a high score feature and joystick control.

PLAYING THE GAME

Type in a copy of *Starfighter* and save it. Type RUN (be sure you have your joystick plugged into Port 2) and a title screen will appear. After about a 30 second delay, the game will start. You are the gray ship (of which you get three) at the bottom of the screen. Your targets are the red enemy ships trying to dodge you.

To control your ship, move the joystick in the direction you want to go. Press the red fire button to fire a bullet (hold down the fire button to shoot a continuous stream of bullets). If you are hit by an enemy ship, you lose one of your own ships and go back to the starting position. If you lose all three of your ships, you will return to the title screen where your score is displayed along with the top five scores. If you wish to start a new game, press the joystick fire button.

SCORING

Every time a bullet hits a red ship, it explodes, and you receive 100 points. If you get hit by a red ship, you both explode and you still receive 100 points. After the game has ended, you get so many bonus points. These are calculated by taking your score and dividing it by 10. If your score is good enough, it will be displayed on the top five score board, ranked appropriately.

I hope you enjoy *Starfighter.* If you like going for top scores, mine's 70,400. □

SEE PROGRAM LISTING ON PAGE 116

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Easier to use than dialing your telephone. Features on-line clock, dialing from keyboard, capture and display high resolution characters, and much more. Includes exclusive easy to use program for up and down loading to printer and disk drives. ***Best in U.S.A.*** List $99.00 **SALE $29.95**

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Same features as the above modem along with C-128 mode and 1200 Baud speed. List $199.00 **SALE $79.95**

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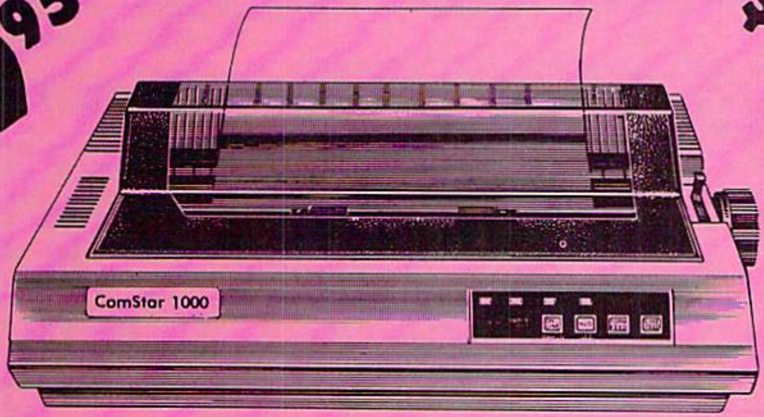
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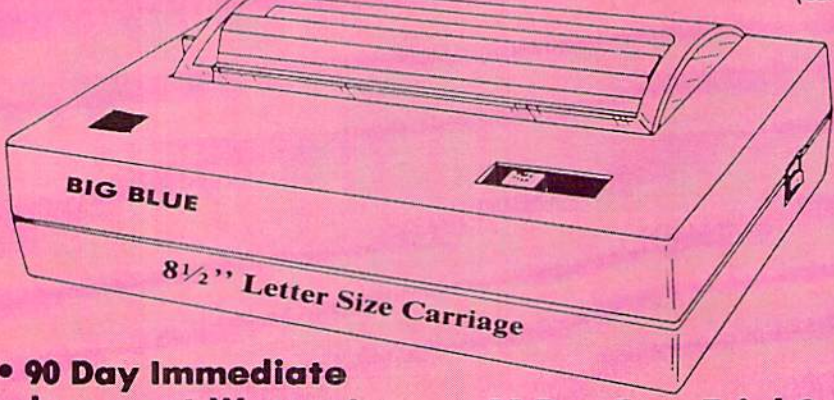
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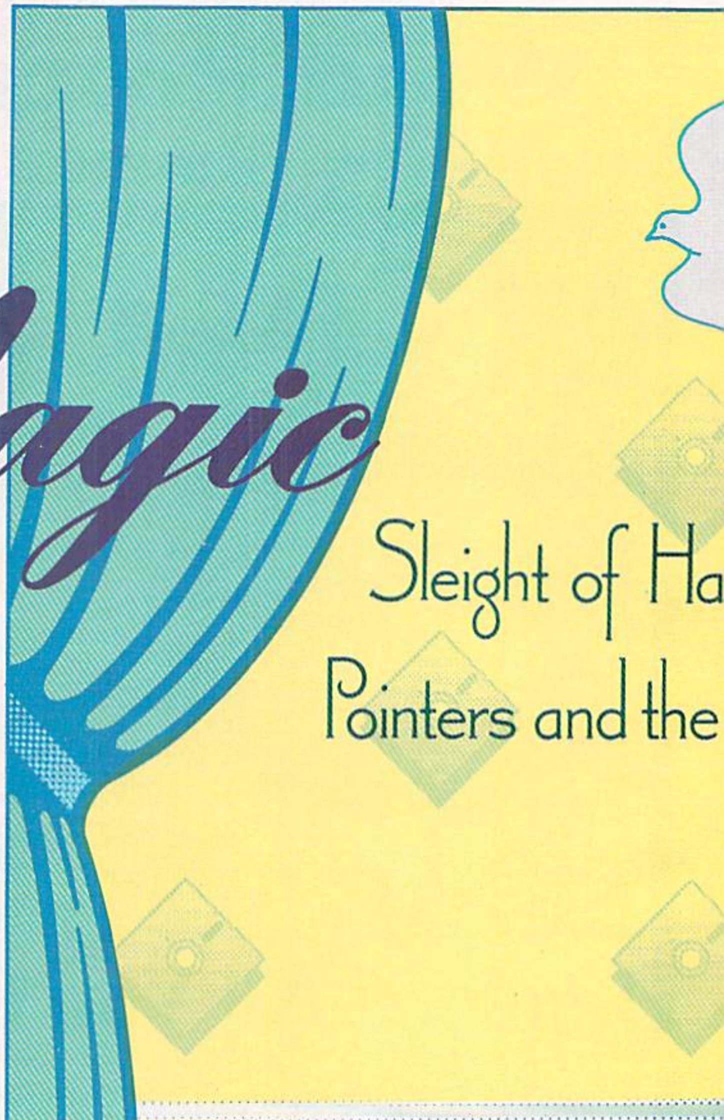
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Basic Magic



By Dale Rupert

It seems like magic. Program lines vanish before your very eyes, then mysteriously reappear. Entire programs are erased and yet somehow miraculously rematerialize. No, it is not done with mirrors. This computer magic is all performed with pointers and some help from the machine language monitor program.

The Commodore 128 has a built-in program called the monitor which allows easy access to the inner workings of the computer. With the monitor, we can easily search for, look at, and change values in memory. After we load a BASIC program into memory, we can call up the monitor and begin to perform some tricks.

If you are using a different computer, the ideas we will discuss are still applicable, but you must use an externally loaded monitor. Also the addresses and values will be different from those used by the C-128. Refer to *Rupert Report #12, Diving Into BASIC*, in the December 1984 issue of *Ahoy!* for details about the C-64.

There are a few concepts which must be clear before we can begin to see what is going on inside our BASIC programs. Probably the most confusing and important aspect of our discussion deals with pointers. A pointer is a number which represents a memory address. A pointer is stored in two parts in adjacent memory locations. The most difficult aspect of dealing with pointers is distinguishing between the *address* of the pointer and the *value* of the pointer.

The address of a pointer tells where the value of a pointer is stored in memory. For example, page 503 of the *C-128 Programmer's Reference Guide* lists a pointer called TXTTAB which is stored at address $002D (45). (All hexadecimal values will be preceded by a dollar sign. All other numbers are assumed to be decimal values.) If we look at memory location $002D (45), we will see a one-byte quantity which is the least significant byte (LSB) of the value of the pointer TXTTAB. At the next higher memory location $002E (46) is the most significant byte (MSB) of the value of TXTTAB.



JACK TOM

The actual value of TXTTAB is the combination of its LSB and its MSB in the following manner:

```
TXTTAB = LSB + 256 * MSB
```

If you just turn on your C-128 and enter this:

```
PRINT PEEK(45), PEEK(46)
```

the computer displays 1 and 28. The LSB is 1 and the MSB is 28. Consequently the value of the pointer TXTTAB is 7169 (1 + 256*28). According to the *PRG*, this means that the text of our BASIC program will begin at location 7169. If we load a program and then look into memory starting at address 7169, that is where we will find our program.

Let's reiterate. The pointer to the start of BASIC text

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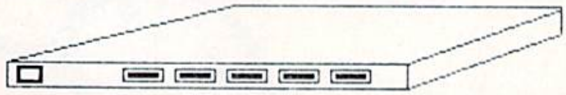
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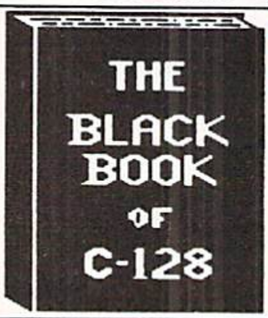
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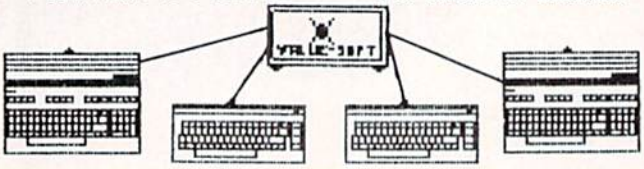
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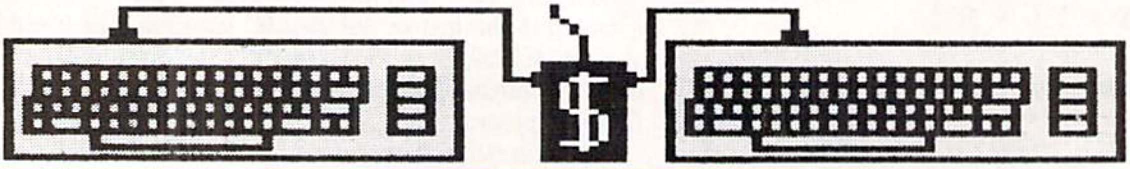


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is called TXTTAB, and it is always located in the two bytes of memory at addresses 45 and 46. The value of the pointer TXTTAB is determined by reading those two bytes of data, LSB and MSB, and combining them as shown above. The value of the pointer may vary, but its address will not.

Just to show how the value of TXTTAB changes, enter this statement:

```
GRAPHIC 1
```

This statement causes a block of memory to be set aside for bit-map graphics. As a result, the storage area for BASIC programs is shifted higher in memory. Now if you enter

```
PRINT PEEK(45) + 256 * PEEK(46)
```

the result is 16385 ($4001). The value of the pointer TXTTAB is 16385, and that is where the text of our BASIC program begins in memory.

Bring things back to normal with this statement

```
GRAPHIC CLR
```

and then find the value of the pointer. It should equal the original 7169. The 9 Kbytes is no longer allocated to the graphics color memory and bit map. Now 9216 additional bytes are available for a BASIC program.

Interpreting pointer values is somewhat easier in hexadecimal than in decimal. Enter the monitor program by typing MONITOR (or press SHIFT-f8 if you have not redefined your function keys). To see the value of the pointer TXTTAB, simply enter M2D,2E. The monitor speaks fluent hexadecimal. The M command tells the monitor to display memory locations from $2D to $2E. The monitor actually displays the next multiple of 16 addresses (8 if you are using the 40-column display). You should see one row of memory values starting at location $2D like this:

```
>0002D 01 1C ....
```

This means that the value at address $2D ($0002D) is $01, and the value at address $2E is $1C.

The value of TXTTAB in hexadecimal is found by combining the LSB ($01) and MSB ($1C) in reverse order, hence $1C01. Amazingly enough this is equal to 7169, which we calculated earlier in BASIC.

You may use decimal values in the monitor by preceding them with "+". For example, M+45,+46 displays the same results as M2D,2E. Also, you may press the space bar instead of the comma to separate starting and ending addresses. If you don't specify an ending address, the monitor displays 12 lines of output.

To exit the monitor, enter X. That returns you to the READY prompt in BASIC. Run and study *Pointer Printer* on page 112 to display the values of pointers at addresses 45 (TXTTAB) and 4624 (TEXT_TOP).

MONITORING A PROGRAM

Enter the following program exactly as shown below:

```
1 PRINT"LINE 1"
2 PRINT"LINE 2"
3 PRINT"LINE 3"
```

There should be one space after the first number and one space before the second number in each line. Be sure to put the quotation mark at the end of each line. Each line is 15 characters long.

Enter GRAPHIC CLR if you have been using a graphics display. Then enter MONITOR. Type M2D,2E to find where in memory your program starts. The first two bytes should be 01 1C as we saw before. From this we know to look at address $1C01 to find our program. (The monitor displays five-digit addresses. The first digit represents the bank number which will be zero in our examples. Address $1C01 in bank zero is displayed by the monitor as $01C01.)

Type M1C00 and press RETURN. Location $1C00 contains 00. Our program begins with $0F at location $1C01. In the ASCII display at the right of the screen, you should recognize the literal parts of the program within quotation marks. The line numbers and the PRINTs are not seen in the ASCII display.

Let's examine the structure of a BASIC program in memory, using the hexadecimal side of this monitor display. The first seven bytes starting at $1C01 are

```
0F 1C 01 00 99 22 4C
```

The first two bytes form a pointer to the start of the next BASIC line. We will come back to that in a moment. The next two bytes ($01 $00) are the hexadecimal representation of the line number in standard LSB MSB fashion. The line number of the first line is $0001 or 1. The $99 is the hexadecimal value for the PRINT statement token. The $22 and $4C represent the first quotation mark and the "L" at the start of "LINE 1." To see this, count characters in the ASCII display at the right. (Bytes with undisplayable ASCII values are shown as dots.)

We used the pointer TXTTAB at address $002D to locate the first line of our program, which is at $1C01. The first two bytes at $1C01 (LSB=$0F and MSB=$1C) form a pointer which shows where the second line of the program begins. This pointer at address $1C01 written as MSB,LSB has a value of $1C0F. If you look at the monitor display for addresses $1C0F and $1C10, you should see $1D and $1C which are the LSB and MSB of the pointer to the third line of the program. Therefore we know the third line starts at $1C1D.

Look at the two bytes starting at $1C1D. This is a pointer to the start of the next line of the program, but our program has only three lines. Where does this pointer lead us? The pointer at $1C1D has a value of $1C2B (the

two bytes starting at $1C1D are $2B and $1C). If we look at $1C2B, we see two bytes of 00. The computer knows it has reached the end of a program when it comes to a pointer with a value of $0000.

It should be helpful to summarize the pointers:

Pointer at $002D points to $1C01 (start of line 1)
Pointer at $1C01 points to $1C0F (start of line 2)
Pointer at $1C0F points to $1C1D (start of line 3)
Pointer at $1C1D points to $1C2B (two bytes of zero)

One more pointer is important for some of the tricks we want to do. That is the pointer called TEXT_TOP at address $1210. This pointer locates the byte just past the double zeros at the end of the program text. If you enter M1210,1211 in the monitor, you should see two bytes $2D $1C which represent $1C2D. This pointer will change as we change the number or size of lines in our program.

TIME FOR TRICKS

With only a few pointers up our sleeve, we can perform magic. Our first trick is called "The Disappearing Line." With our three-line program in memory, from the monitor enter M1C00. Change the pointer at the start of line 1 so that instead of pointing to line 2, it points to line 3. That is very easy to do. Simply move the cursor up to the "0F" at address $1C01, type 1D, and press RETURN. Once you press the RETURN key, that value is changed in memory from $0F to $1D. (We don't need to change the MSB of the pointer at address $1C02.) Move the cursor to the bottom of the display (or press ESC @) and enter X to return to BASIC.

In BASIC enter LIST. Presto, chango! Lo and behold, line 2 has vanished from sight. But now for something *really* mystifying. Enter RUN and what do you see? The output shows that all three lines are still executed. LIST the program again, and it looks like there are only two lines.

There are two ways to bring back the vanished line. We could return to the monitor and change the pointer at $1C01 back to $0F. Rather than do that, try this amazing feat. Pick some magic number from 4 to 63999. Got one? In BASIC simply type your selected number. Press RETURN and enter LIST. If you picked the correct number, line 2 should be right back in its original place.

What's the secret? Of course a good magician doesn't reveal his secrets, but that doesn't stop me. To be honest, entering *any* number from 4 to 63999 will restore the vanishing line. (Even 0 will work as well.) When you enter any potential line number, BASIC relinks all of the program lines in memory. That means that all of the line pointers are recalculated. The relinking routine sees a line number 2 which should be between line numbers 1 and 3, so it recalculates the pointer value at the start of line 1.

Evidently the RUN routine does not pay attention to the line pointers since it executed line 2 without a pointer to it. The LIST routine just stepped from pointer to pointer and consequently bypassed line 2.

Have you ever noticed a slight delay after entering a new program line in the midst of a very long program? The reason for the delay is that the computer is recalculating all of the line pointers and moving higher-numbered lines higher in memory. The computer knows where each line ends because there is one byte of 0 after each line, as you can see in the monitor display.

THE DISAPPEARING PROGRAM

Enough of the small stuff. Anyone can make one line vanish and bring it back. How about a whole program? We have within our power the ability to revive a program which may have been given up for lost. Once again, all we need is some sleight of hand known as pointer twiddling.

Make sure our three-line program from above is in memory. LIST and RUN it just to be certain. Enter NEW. LIST and RUN now imply that the program no longer exists. There is no evidence of it in BASIC.

Let's look under the covers. Enter MONITOR and again enter M1C00. Even to the uninitiated eye, the three lines of text are clearly displayed right where they used to be in the ASCII display on the right side of the screen.

The program certainly is there in memory. So why can't it be LISTed and why doesn't it RUN? The solution is so simple, and right before your eyes. Notice the three bytes of 00 at the start of the display. The computer sees the pointer at $1C01 as 00 00 and assumes it has reached the end of the program. All we need do is relink this first pointer, and the program text will be good as new.

We already know from above that this first pointer should be $1C0F to point to the second line of the program. Move the cursor to the 00 at address $1C01 and type 0F. Then press the space bar so the cursor is on the 00 at address $1C02 and type 1C. Now press RETURN and the program has been relinked. Move the cursor to the bottom of the display and enter X to return to BASIC. Abracadabra, the program can be LISTed and run. But is everything just as it was before? Well, not exactly....

There is one more pointer which was affected by the NEW command and must be fixed up before we can add lines to our program or change it in any way. That is the TEXT_TOP pointer at $1210 which we discussed earlier. In the monitor, enter M1210,1211. You will see that this pointer has been reset to $1C03. We must make it point three bytes past our program once again.

To find the end of the program, in the monitor type the Hunt command H1C05,1CFF,0,0,0 and press RETURN. This command requests the monitor to hunt from address $1C05 to $1CFF for three consecutive bytes of zero. The first address at which three consecutive bytes of zero are found is $1C2A. Add three to this address getting $1C2D. Now type M1210,1211 and press RETURN. Position the cursor at address $1210 and type 2D. The next byte is already $1C so we don't have to change it. The TEXT_TOP pointer now points three bytes past the end of our program. Press RETURN and our lost program is as good as new, or un-NEW.

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THE COMMODORE MAGAZINE THAT OFFERS YOU MORE

Unlike the disappearing line trick, this restored program trick might actually be useful sometime. If we accidentally type NEW without meaning it, we know that changing two pointers with the monitor will bring the program back. We already knew what the first pointer at $1C01 should have been for our sample program. How do we find the value of that pointer for any other program? Recall that the pointer at $1C01 points to the start of the second program line. Also recall that the first (and every) program line ends with one byte of zero. All we need to do is find the zero byte at the end of Line 1.

Here is an easy way to find the end of Line 1. In the monitor, type the Hunt command H1C05,1CFF,0 and press RETURN. You will generally see numerous addresses displayed. We have requested the monitor to Hunt between addresses $1C05 and $1CFF for one byte of 0. If you look through the M1C00 display, you should see that all the addresses listed by the Hunt command do indeed contain zero.

By starting our search at $1C05, we bypass any 0's in the first line pointer and in the line number. Therefore the address of the first zero byte corresponds to the end of the first line. That address is $1C0E. Consequently we must set our first line pointer to a value which is one greater than this, namely $1C0F. That is why we stored $0F at address $1C01 and $1C at address $1C02.

Of course we could have visually hunted through the M1C00 display until we found the zero at the end of the first program line, but the Hunt command is easy and foolproof. Don't forget to add one to the address found by the Hunt command. We want to point to the start of the next line, not the end of the current line.

In a nutshell, the procedure to un-NEW a program is:

1. Enter the monitor and type M1C00.

2. Hunt for the end of the first program line: H1C05, 1CFF,0

3. Add one to this address and restore the next-line pointer at $1C01 with this new value. (Remember LSB, MSB).

4. Hunt for the end-of-program address: H1C05,1CFF, 0,0,0

5. Add three to this address and restore the TEXT_TOP pointer at $1210 with this new value.

For long programs, you may have to hunt over a larger interval than shown in step 4. H1C05,FFFF,0,0,0 covers the full range. If graphics memory has been allocated or if BASIC storage has been moved from $1C01, use the TXTTAB pointer at $002D to find the start of your program. (Change addresses in steps 1 through 4.)

TWO INTO ONE

Our final feat of prestidigitation this month will in-

volve a juggling of pointers so rapid as to make the eyes of the neophyte spin. What initially appear as two independent programs will suddenly and effortlessly emerge as one.

BASIC uses the TXTTAB pointer at $002D to know where in memory to begin loading a program. Initially this pointer has the value $1C01 (or $4001 if the graphic screen is allocated) as we have seen before. We will load one program into memory. Then we will move the TXTTAB pointer up to the end of that program. We will load a second program into memory starting at the end of the first program. Finally we will move TXTTAB back to the start of the first program. Thus the two programs will be merged into one.

From our previous discussion of the structure of the BASIC program and its pointers, this sequence of steps should not be difficult to follow. Since we will do this trick in BASIC, we will use decimal values. The numbers between parentheses are the decimal values of the addresses.

To merge two programs:

1. Load the first program into memory.
2. Save the value of original TXTTAB pointer (45 & 46).
3. Find the end of the first program by subtracting two from the address in TEXT_TOP pointer (4624 and 4625).
4. Put this result into TXTTAB pointer.
5. Load the second program.
6. Restore TXTTAB pointer to values saved in step 2.

To make this procedure as effortless as possible, I use a function key definition as follows:

```
KEY 4,":POKE 7,PEEK(45)
     :POKE 8,PEEK(46)
     :A=PEEK(4624)
     :B=PEEK(4625)
     :POKE 45,A-2-16*(A<2)
     :POKE 46,B+(A<2)
     :DLOAD(F$)"
     +CHR$(13)
     +"POKE 45,PEEK(7)
     :POKE 46,PEEK(8)"
     +CHR$(13)
```

This is typed as one long string assigned to function key 4, although you may use any other function key. Since string storage space for all function keys is limited to 241 characters, you should not type any spaces, and you should use abbreviations for the keywords (PO shift-K, PE shift-E, and D shift-L). You should add a line number in front of KEY and save this as a one-line program called KEY4, for example. Before loading the first program to be merged, type RUN"KEY4" and NEW to redefine just this function key.

To use this function key once it is defined,

1. Load the first program.
2. In direct mode, type F$="*filename*" where *filename* is the name of the next program to be merged. You must use F$.
3. Press function key 4 (shift-f4).

That's it. Type LIST and see that the two programs are one. Before merging, you should make sure that all line numbers in the second program are higher than line numbers in the first, since the second program is merely appended to the end of the first. It is possible to RENUMBER the merged program even if there is an overlap in line numbers, but it is more logical to renumber the programs properly before merging.

This key definition uses page zero addresses 7 and 8 as temporary storage for the original values of TXTTAB. (The DLOAD will reset all numeric variables to 0 so we must save the values elsewhere.) A and B store the LSB and MSB of TEXT_TOP from which two is subtracted. If the LSB is greater than or equal to 2, we simply subtract 2 from it and leave the MSB alone. In that case, the expression (A<2) equals 0. The logical expression (A<2) is −1 if A is less than 2, in which case we must add 14 to the LSB rather than subtract 2. (We actually add 16 since the 2 is already subtracted.) Also if the LSB (A) is less than 2, we must subtract 1 (borrow) from the MSB.

Next the second program is loaded, and finally the TXTTAB pointer is returned to its original value. The DLOAD updates the value of TEXT_TAB automatically.

You may actually merge any number of programs. Simply repeat steps 2 and 3 for each additional program. This merge function might encourage you to develop a library of fundamental routines which are appended to your main program as needed.

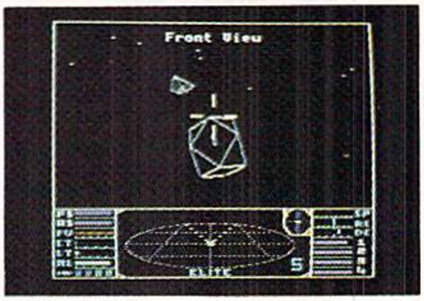
The secret to all we have done here is an understanding of pointers. After you mystify your friends and amaze your acquaintances with these magical BASIC abilities, tell them there is really nothing to it. Of course it's easy when you know the secret. □

SEE PROGRAM LISTING ON PAGE 112

THE YEAR'S BEST ENTERTAINMENT

Finest Funware of 1986 for the C-64/128

By Arnie Katz and the editors of *Ahoy!*



Elite: *possibly best game of the year.* *READER SERVICE NO. 292*



Battlefront: *new level of complexity.* *READER SERVICE NO. 293*

Featured This Month:

"It was the best of times, it was the worst of times," Charles Dickens might have described the past year in entertainment software for the Commodore 64/128. Contradictory trends rippled through the field in the preceding 12 months, and the verdict on 1986 pretty much depends on the view of the individual computerist.

Those who demand a constant stream of new disks probably experienced some disappointment. Quantity declined precipitously for several reasons:

1. A number of small publishers who concentrated on producing software for the Commodore went out of business or diversified.

2. The Commodore 64/128 was the focus of leisure software development in 1984 and 1985. Now many companies create their games on the newer 68000-based home computers.

3. British reliance on Commodore systems which incorporate tape drives is making it progressively harder for stateside companies which rely on sales to this secondary market to produce lots of programs, because so many proposals will not work properly on tape.

Quality is another matter. The Commodore has been around long enough to become thoroughly understood by designers and programmers. While development houses grope for knowledge and insight about the Amiga, Atari ST, and even the Macintosh, the Commodore 64/128 is as comfortable as an old sweatshirt.

This high level of knowledgeability partially compensates for the technological superiority of some of the newer brands of home computers. The designers who work on the Commodore 64/128 capitalize on more of the unit's potential than those who are still finding their way on more recently introduced systems.

Admittedly, this feeling of "comfort" has a negative side: Familiarity breeds ennui, if not outright contempt. Few of this year's new games and entertainments for the C-64/128 are startlingly original. Slick professionalism is the current order of the day. That isn't such a bad thing, all in all. The best of 1986's new disks are thoughtfully designed and programmed with consummate skill.

As a group, this year's winners are characterized by involving themes, a high degree of playability, and the kind of meaty richness which stands the test of time. The best of 1986 are great games first and foremost, not demonstrations of stunning technical virtuosity.

The writers who regularly cover entertainment for *Ahoy!* have collaborated on this survey of the best funware for the Commodore. The compilers beg the understanding of readers whose favorites were omitted and publishers whose worthy titles arrived just a little too late for inclusion. Modesty also forbids inclusion of *Borrowed Time* (Activision), the hardboiled detective adventure which Subway Software (Arnie Katz, Bill Kunkel, and Joyce Worley) coauthored with Interplay Productions.

Strategy

Variety is the hallmark of this category, which includes everything from detailed military simulations to "family fun" computerized, boardgames. Last year, like 1985, was a banner one, as brain games continued to dominate.

Elite (Firebird) is a top candicate for the laurels as Commodore game of the year. This economic and military simulation presents the full breadth of trading and skirmishing in the vastness of intergalactic space. The game's 18 types of spaceships are

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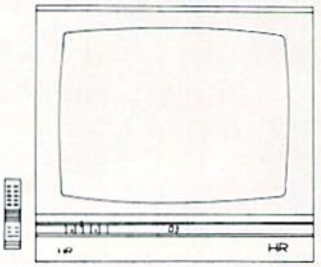
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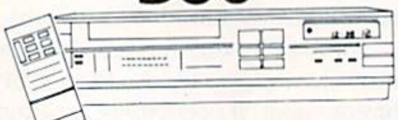
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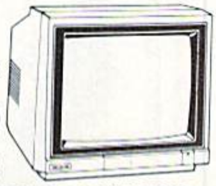
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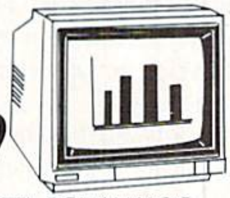
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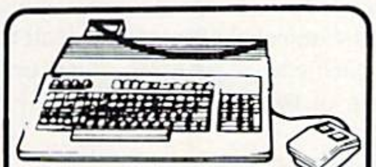


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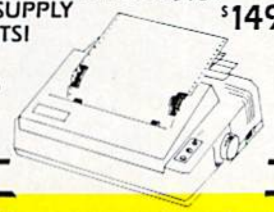
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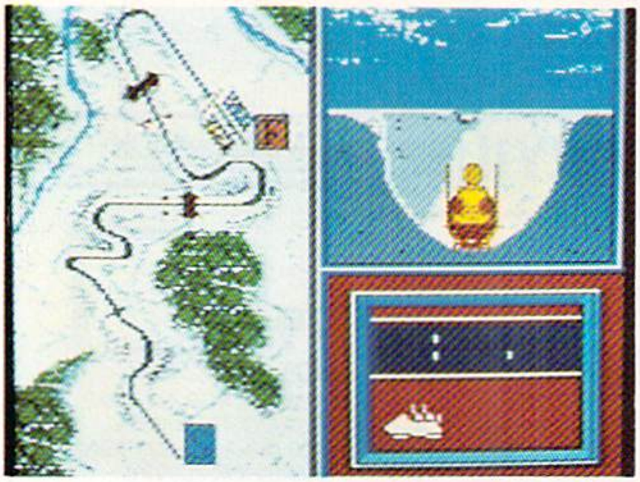
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The third entry in the Epyx sports trilogy that began with **Summer Games I** *and* **II, Winter Games** *lives up to the series' high standards. READER SERVICE NO. 286*

rendered in attractive line graphics. *Elite* can't be mastered without much study and practice, but no other strategy title published in 1985 is more challenging or absorbing than this British design.

Eon Software has made a spectacular transition from designing nonelectronic boardgames like *Cosmic Encounters* to creating superb strategy software like *Lords of Conquest* (Electronic Arts). The interplay of economic development, military might, and diplomatic machinations generates much of the appeal of this cousin of *Risk and Diplomacy.*

Another of the year's outstanding sequels is *Hacker II* (Activision). Steve Cartwright has concocted a believable follow-up to the original strategy adventure. It's hard to duplicate the off-balance feeling which *Hacker* produced in first-time users, but the remote controlled robots of the original are still fun to manipulate.

The extra wrinkle in *Financial Time Machine* (Insight) is that the speculator can peer into the future to see how his or her plans turned out. This introduces a whole new strategic dimension. *Financial Time Machine* would be an accurate replication of the stock market even without time-hopping. With it, it is a challenging mind-stretcher. (See review, page 54.)

Strategic Studies Group took wargames to a new level of complexity and sophistication with *Europe Ablaze* and *Battlefront.* The former covers the air war over Europe during World War II, while the other explores land combat during the same conflict.

Despite their wealth of detail, both are surprisingly simple to learn due to the system of onscreen menus which allows commanders to input orders quickly. They allow the computerist to assume the duties of commander-in-chief or lead a small force into battle in either stock or customized scenarios. Design tandem Roger Keating and Ian Trout has become a major creative force in computerized military simulations, and armchair soldiers can only wait expectantly for their 1987 releases.

Conflict in Vietnam (MicroProse) and *Nam* (Strategic Simulations) successfully treat a virtual wargaming taboo: the American involvement in Vietnam. By emphasizing the purely military aspects of the war, they avoid the swamp of moral judgment. *Nam* is the latest Ed Bever design to utilize the quick-play format of *Crusade in Europe,* while *Conflict in Vietnam* uses a more traditional approach.

Wendell Chung has meticulously transported *Gulf Strike* (The Avalon Hill Game Co.) from the conventional gameboard to the computer screen. This "what if?" wargame is one of the few which allows the player to command land, sea, and air forces.

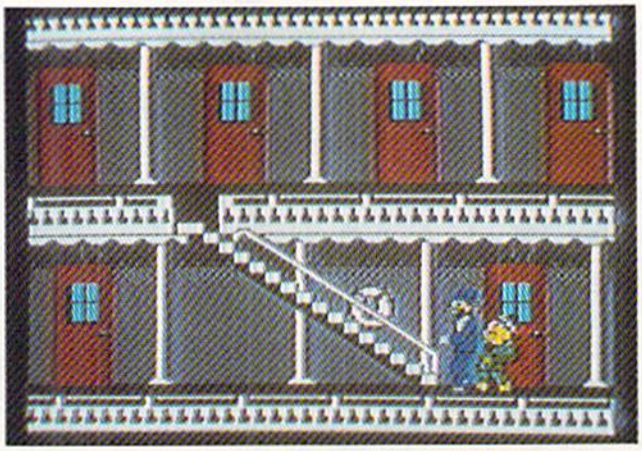
Gary Grigsby, a designer who invariably produces topnotch military simulations, contributed a pair of tactical gems in 1986, *Kampfgruppe* and *Battle Group* (both Strategic Simulations). Simple line-of-sight rules and indirect command control effectively simulate the "fog of war" found on actual battlefields.

Fighter Command (Strategic Simulations) is hardly the first game about the Battle of Britain, but it makes *Ahoy!'s* "Best of the Year" list because of its unique treatment of the subject matter. The pulse-pounding dogfights and heroic air combat actions take place "off the board" in a program which minutely replicates the overall strategic situation.

The beautiful graphics for the submarine's five battle stations immediately stamp Sid Meier's *Silent Service* (MicroProse) as something utterly new in military simulations. The intensity of first-person perspective pumps life into naval combat, which many other titles present with all the excitement of pushpins stuck on a map of the ocean.

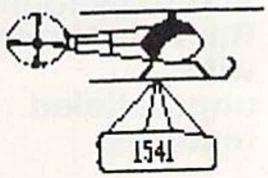
Adventures

Software fashion has played right into the hands of Commodore owners. Two years ago, the text adventure was king of the mountain. Other formats existed, but Infocom's sophis-



Murder on the Mississippi *merits recognition for its mating of an innovative system of onscreen menus to a fascinating concept. READER SERVICE NO. 287*

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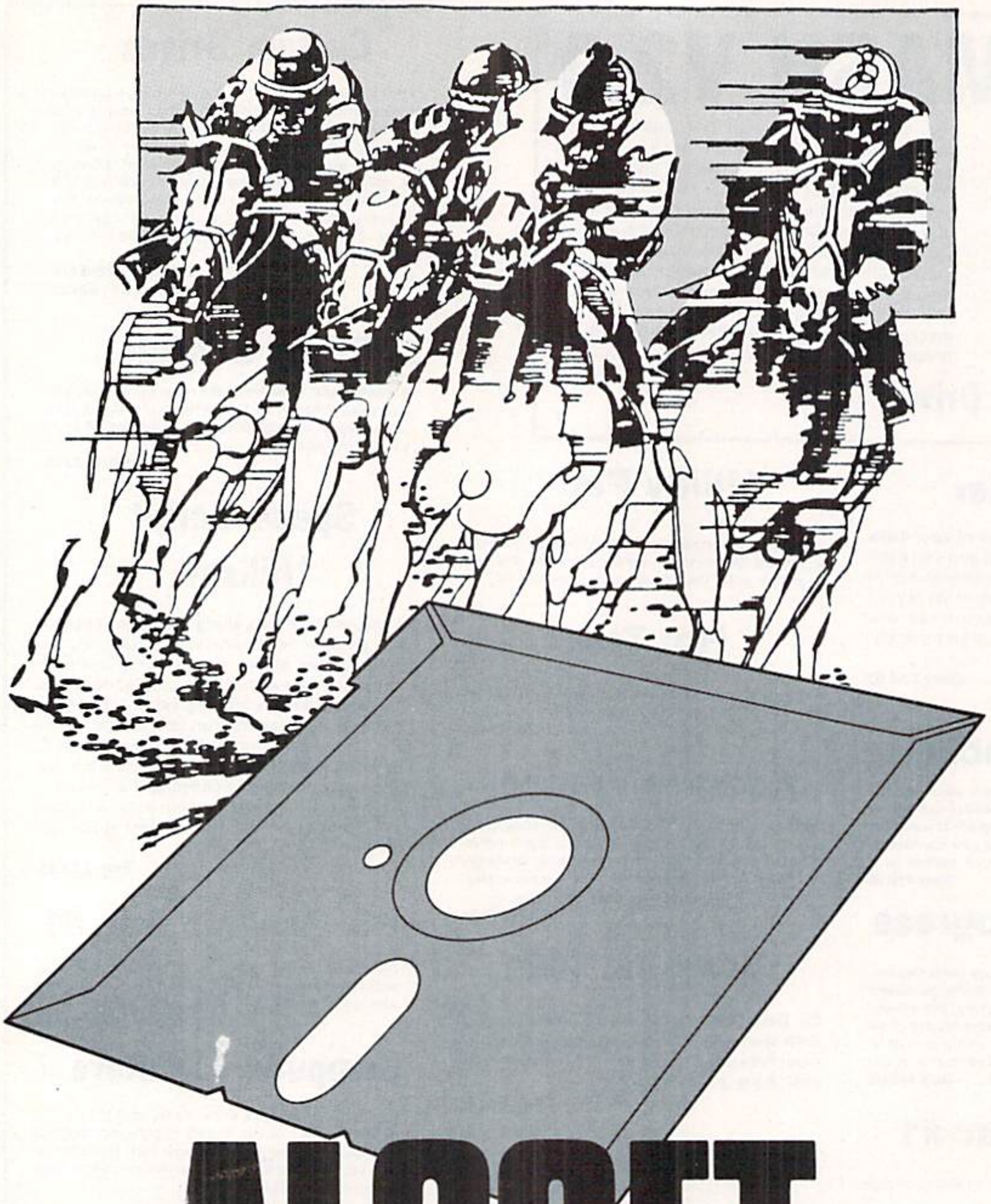
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Reader Service No. 107

ticated parser made prose quests number one among gamers.

Slow disk access makes text adventures cumbersome on the C-64. Infocom fully supported the system, but other labels didn't always do so. And when publishers did target an adventure at the Commodore audience, the conventional wisdom was to keep the scope of the game limited to reduce the number of times the program must pull data off the disk.

Now other adventure gaming systems have surpassed the parser-driven text type in popularity. Programs which feature flashy visuals and extensive audio are especially suitable for the Commodore 64/128 because of its graphic and sonic capabilities.

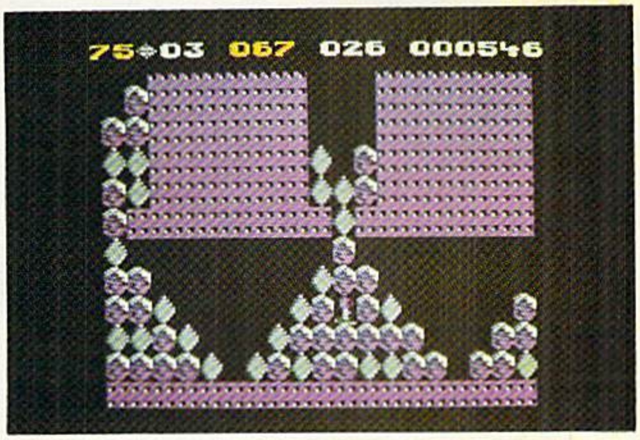
This has had a strong impact on the order in which new titles are translated for the various systems. The Commodore frequently came toward the bottom of the list for getting editions of text adventures, but it's at or near the top for illustrated and graphics adventures.

Avid rolegamers who have wished in vain for a Commodore 64/128 edition of *Wizardry* now have *Bard's Tale* (Electronic Arts). First-person perspective graphics in full-color and sound effects enhance a solid, involving gaming experience. Interplay Productions, designers of *Bard's Tale*, will have the first of many projected sequels ready for publication this month.

Ultima IV (Origin) is not only technically impressive, but quite thought-provoking. It has outstanding and varied graphics for overland and dungeon adventuring, but it is the theme of self-perfection which lifts it far above the usual fantasy treasure hunt.

Adam Bellin's *Murder on the Mississippi* (Activision) is that desirable rarity: a game which mates an innovative system of play to a genuinely fascinating concept. Onscreen menus make it easy for the sleuth to get around the paddle wheeler Delta Princess to find clues and interview suspects.

Alter Ego (Activision) is a mind game which is simple enough to play at a party and has just enough depth to provide substance for self-review.



Super Boulder Dash *combines the rock-dodging original with its sequel,* **Boulder Dash II**, *previously distributed only in Europe. READER SERVICE NO. 288*

The icon-selected interactive vignettes are well-chosen and, for many, will bring back echoes of their own past.

Nine Princes in Amber (Telarium/Spinnaker) proves that fantasy adventures don't have to be scavenger hunts for magic artifacts. The plot, drawn from the first two novels in Roger Zelanzy's Amber series, is a breath of fresh air. The game system, which permits lots of interaction between the protagonist and non-player characters, could easily serve as the basis for sequels to *Nine Princes in Amber* or even completely different adventures. It is an exceptionally fast paced adventure full of tight squeezes and ticklish situations.

You don't have to be a Trekkie to love *Star Trek: The Kobayashi Alternative* (Simon & Schuster), but anyone who enjoys the movies or the TV series shouldn't miss it. The pop-up windows facilitate realistic conversation between the player (as Captain James T. Kirk) and the rest of the crew of the Enterprise, and keep the eye from growing bored with what's on the screen.

Sports

Baseball, football, and the martial arts were the most popular subjects for new sports games for the Commodore. (Other systems experienced a boom in golf simulations, but that won't affect the C-64/128 market until the translations are published this year.)

The publishers' disdain for action contests is reflected in the paucity of arcade-style sports programs. Most of 1986's best newcomers are statistical replay and action-strategy titles.

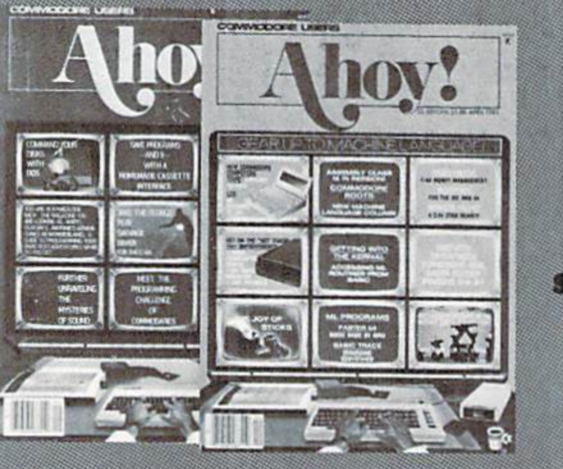
SubLOGIC, a house best known for flying simulations, entered the sports gaming field in a big way in 1986. *Football* and *Pure-Stat Baseball*, both designed by Quest, were the best statistically oriented team sports games premiered last year.

Pure-Stat is the most serious competitor to *Micro League Baseball*,



Scheduled to spawn a series of sequels, **The Bard's Tale** *melds first person perspective graphics and sound effects into a solid adventure game experience. READER SERVICE NO. 289*

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which was the top 1985 release. It includes factors like individualized stadium effects, fielding range, and full lefty-righty adjustments for pitchers and hitters, which no computer simulation had considered.

Football adds the immediacy of joystick control to a statistically based model of professional pigskin action. It doesn't have the mathematical rigor of Quest's 1985 *Super Bowl Sunday* (Avalon Hill), but the real-time control of key players adds plenty of excitement to the game.

Touchdown Football (Electronic Arts) is clearly the best action football title for the Commodore 64/128. The realistic animation and effective three-quarters perspective visuals keep the screen exciting, while the array of offensive and defensive formations and options gives plenty of scope for would-be coaches.

Championship Boxing (Sierra) and *Star Rank Boxing* (Gamestar) are knockout pugilistic programs. The former examines the art of managing great fighters of the past and present, while the latter challenges the computerist to guide a novice from his first prelim to a victory over the champ. Actually, they complement each other beautifully. Together they give a comprehensive picture of boxing from the point of view of the man in the ring and the mastermind in the corner.

A variation of the "climb through the rankings" approach puts *Kung Fu: Way of the Exploding Fist* (UXB/Spinnaker) slightly ahead of a couple of similar titles, *World Karate Championship* (Epyx) and *Karate Champ* (Data East). The ingenious joystick control schemes employed in both titles allow the gamer to try a great variety of martial arts maneuvers without having to hang over the keyboard.

The only thing more surprising than the brilliance of *GBA Championship Basketball Two on Two* (Gamestar) is that no one did it sooner. When Electronic Arts' *One on One* rocketed to instant classic status, everyone predicted that a slew of similar sports programs would follow. They never materialized. By adding a second player, *Two on Two* can highlight passing and pattern play, the very aspects of roundball which *One-on-One* neglected.

The eight smoothly animated events of *Winter Games* (Epyx) are a symphony of computer sports excitement. Epyx will eventually run out of suitable athletic contests, but the third title in the series which began with *Summer Games* lives up to its predecessors' high standards.

Action

In the short term, there's nothing deader than a fad which has reached burnout. In retrospect, 1986 will be remembered as the year the popularity of action contests hit bottom and started to rebound.

The introduction of two titles, *Ultimate Wizard* and *Super Boulder Dash* (both Electronic Arts), provides the major sign of hope.

Though the games themselves are quite different, the marketing philosophy is similar. In both cases, EA has acquired a popular game from a small publisher and extended it with a sequel. Either title can keep a computerist playing happily for hundreds of sessions.

The Goonies (Intellicreations) is one of the few recent games based on a film license. Its eight action puzzles evoke the same lighthearted feeling as the movie while also challenging the gamer's strategic skills.

Looking Forward

Is 1986 the last great year for Commodore 64/128 software? Pessimists might have answered this question affirmatively as recently as six months ago, but the current trend is positive. Commodore's introduction of the economically priced C-64C is expected to extend the sales life of the hardware and, as a result, give development of software a shot in the arm in 1987.

Whatever the future holds, there's no question about the recent past. The crop of new games released for the Commodore 64/128 in 1986 is a rich harvest of fun for computerists. And based on manufacturers' announced plans for '87, the new year looks bright as well. □

TOP GUNNER COLLECTION
MicroProse
Commodore 64
Disk; $24.95

Top Gunner Collection is a compilation of three air-action contests from MicroProse: *Hellcat Ace, Mig Alley Ace,* and *Air Rescue.* Although none measures up to the current top flight simulators, getting all three on one disk is quite a bargain.

Hellcat Ace, originally published in 1983, is a streamlined cockpit-perspective dogfight program. This WWII air combat exercise assigns almost all control functions to the joystick, making it very easy to operate. The pilot's onscreen data sources include a rearview mirror, ammo and power gauges, and speed, course, and altitude indicators.

Fourteen different scenarios are offered, ranging from Pearl Harbor to the invasion of Okinawa (April 2, 1945). Each of these generally boils down to a one-on-one dogfight between the player and an enthusiastic

opponent from Air Nippon.

Different scenarios involve various types of aircraft. In the Flying Tiger (August 13, 1940) sequence, players pilot a P-40 Tomahawk fighter, the Wake Island (December 11, 1941) scenario employs the F4F Wildcat fighter, and the battle for Leyte Gulf (October 24, 1944) puts the gamer at the controls oif a revamped Devastator torpedo bomber.

The graphics are simplified and two-dimensional, but *Hellcat Ace* generates plenty of excitement with its all-out action. This game doesn't waste time raising its flaps and dropping its ailerons, either; *Hellcat Ace* is about catching a winged enemy in one's sights and blasting it to rivets.

Mig Alley Ace shares a similar orientation, but with a fascinating twist: dual cockpits split the screen, allowing two players to engage in a genuine head-to-head dogfight, or fly in squadron leader/wingman tandem against a pair of North Korean jets.

As in *Hellcat Ace, Mig Alley Ace* offers a variety of simulated aircraft, again determined by the scenario. Gamers pilot an F-80 Shooting Star, a modified C-119 transport, an F9F, or an F-86 Sabre Jet, with all functions (except for increase/decrease throttle and bail out) handled via joystick(s). Onscreen displays include exhaust gas temperature (EGT), power, ammo indicator, radar, altimeter, and air speed indicator.

The five scenarios are the Battle for Pusan (September 2, 1950), Sunchon Airdrop (October 20, 1950), Mig Alley (December 7, 1950), Sinuiju Airfield (January 23, 1951), and Operation Strangle (June 20, 1951).

Mig Alley Ace was originally released in 1984. Again, the graphics betray the program's age, but the contest is well-delineated.

Air Rescue, on the other hand, is a derivative arcade contest which borrows elements from *Super Cobra, Defender, Choplifter,* and several other action shootouts. Players pilot an onscreen super-copter, armed with both bombs and missiles, through an underground labyrinth stocked with missile launchers and computer-controlled combat helicopters. The gamer must maneuver the craft through this dangerous subterranean civilization in order to rescue members of the archeology team who discovered it, and in the process inadvertently set off its computerized defenses.

Like the other two contests in the package, *Air Rescue* suffers from overly simple graphics. Unlike *Mig Alley Ace* and *Hellcat Ace*, however, it doesn't balance the ho-hum visuals with new or exciting play-action.

The documentation for this package is a booklet-sized collection of the original instructions from all three games. The *Hellcat Ace* section incorrectly instructs players to plug their joystick into Port 1, but the rulebook is otherwise solid if minimal. The *Mig Alley Ace* instructions include a brief section on air combat tactics. Both *Mig Alley* and *Air Rescue* employ "verification codes," a pirate-busting scheme devised by MicroProse which integrates the documentation into the loading process.

Top Gunner is a nice enough collection, though *Air Rescue* is clearly out of place. The third game should have been *F-15 Strike Eagle,* which is the best of MicroProse's air combat programs.

MicroProse, 120 Lakefront Drive, Hunt Valley, MD 21030 (phone: 301-667-1151). *—Bill Kunkel*

THE NEVER ENDING STORY
Datasoft
Commodore 64
Disk; $29.95

The Land of Fantasia is facing oblivion. Only a determined adventurer can halt The All-Consuming Nothing destroying the kingdom. More than a little grit is needed to survive this epic based on the book and film of the same name. It takes perseverance, imagination, and real gaming savvy to solve the puzzles, locate the medallion, enter the Ivory Tower, and restore the Empress to her throne.

As the heroic Atreyu, the gamer treads a kingdom of beautiful creatures and trecherous foes. The challenge begins with a sage warning—Cairon the physician says a hero is needed to stop the Nothing consuming the land. The doc doesn't squander any words of advice, though, and Atreyu hasn't a clue about what to do until Rockbiter drops by and says he's off to the Ivory Tower to chat with the Empress. He makes for the woods, leaving not so much as a trail to follow, and from then on, Atreyu is on his own.

Eventually, as Atreyu stumbles blindly through the terrain, he comes across a few helpful devices, other forest folk, and Falkor the luck dragon. If Atreyu manages to slice through the sadness that protects Morla, he wins the first concrete advice: instructions to quest for the Southern Oracle, who'll theoretically provide some answers.

Like the book that inspired it, *The Never Ending Story* is a sightseeing trip through a variety of challenges, puzzles, and marvels. The gamer encounters many people along the route, some helpful and others dangerous, and can pick up objects which come in handy down the road.

The parser is a bit restrictive compared with those found in state of the art interactive adventures. It recognizes only a fairly limited vocabulary, so attempts to find the exact verb/noun combinations required are sometimes frustrating.

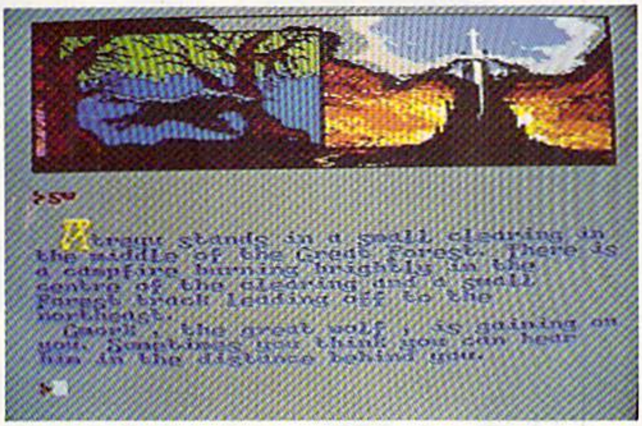
The Never Ending Story employs a sophisticated graphic treatment that makes Atreyu's quest a pleasure to watch. A panoramic view of the land stretches across the top third of the screen. Windowed on the left is the specific view of the current location. Atreyu's inventory of objects is pictured on the right side of the screen. Everything is depicted onscreen in an array of startlingly bright colors that add a fantastic element to the scenes pictured.

The text fills the lower part of the display. The text unfolds in artistic calligraphy, complete with fancy initial capitals, in a combination of blue, red, and yellow script. It's not absolutely blinding, but reading ease was obviously not uppermost in the calligrapher's mind. Still, it adds some graphic spice to the adventure.

The music which accompanies the onscreen action is drawn from the movie. When the song gets tiring, players may want to toggle it off.

The Never Ending Story is a lengthy adventure with more than 125 locations. The primitive map that accompanies the scanty documentation looks like it was drawn in the Land of Fantasia: it only provides a few hints about the geography of this peculiar kingdom. Reading the novel or viewing the movie might provide some assistance, but it isn't necessary to have experienced those antecedents in order to triumph over Nothing and save Fantasia. For the most part, the adventurer must uncover each route through trial and error, and by scrupulous attention to each conversation with the folks Atreyu meets on his journeys through the land. That and a carefully constructed point-to-point map should help to win the day.

The Never Ending Story may not be the most sophisticated adventure ever penned for the computer, but it's a rousing romp through a colorful land.



The Never Ending Story *is a sightseeing journey through a variety of challenges, puzzles, and marvels in more than 125 locations. READER SERVICE NO. 290*

Intellicreations, 19808 Nordhoff Place, Chatsworth, CA 91311 (phone: 818-886-5922). *—Joyce Worley*

GETTYSBURG: THE TURNING POINT

Strategic Simulations
Commodore 64
Disk; $59.95

One of the most frequent complaints about wargames is that they're too difficult for all but the most experienced gamers to handle. The flip side of the coin is that lovers of military simulations lament that the simpler games grow boring after only a few rounds of play.

Gettysburg: The Turning Point answers both those complaints effectively. It is probably the best war simulation SSI has ever produced.

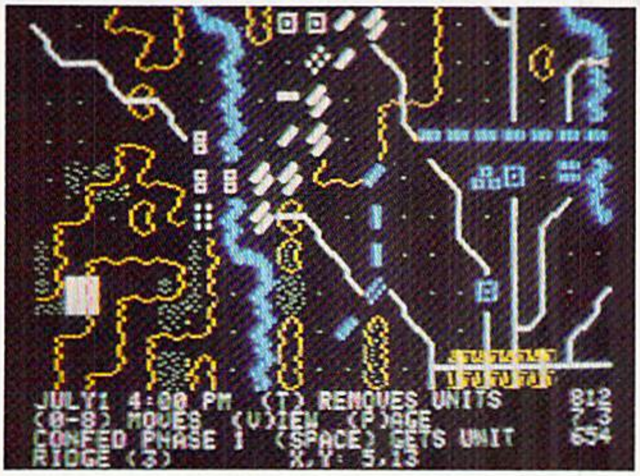
Gettysburg follows the lead of *The Battle of Antietam* in two respects. It employs the same sensible game system which David Landrey and Chuck Kroegel introduced in that title, and it offers a choice of three skill levels.

Gettysburg sealed the fate of the Confederacy in the Civil War. The actual battle began by accident instead of grand design, but don't try to win the electronic version by luck. Whether you choose to take the underdog role of the Confederate Army or champion the cause of the Union, and no matter if facing a computer or human foe, the name of the game is planning. Rash decisions have very little chance of leading to success.

The introductory level is geared to the novice, and the rule book is written with that in mind. There are step-by-step instructions for getting started as well as simplified explanations of the operations and combat phases of the game.

The more experienced warrior will want to start at the intermediate or advanced levels. Even those who have played *Antietam* will be surprised at the advances in the system.

One new feature is the effect of the leaders upon performance on the battlefield. A unit's ability to rally and resupply ammunition is often affected by the leader's ranking. In other



Gettysburg: The Turning Point *considers factors like visibility, line of sight, range, morale, and fatigue in deciding results of combats. READER SERVICE NO. 291*


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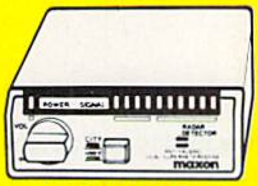


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words, don't send a boy to do a man's work, or the work isn't likely to get done. Other improvements include more realistic fatigue factors, and a combat system that figures the results of battles down to the fate of each and every soldier.

Gettysburg considers such factors as line of sight, range, visibility, morale, and fatigue when deciding the results of any combat. Yet all of the calculations are done with great speed and efficiency.

The rulebook is one of the best ever produced for any type of game. The rules are condensed into 10 pages. The prose is written precisely and to the point. The only complaint might be the lack of examples. There are five pages which detail the organization and order of battle for each side. These are especially valuable in the advanced game. Then there are three pages of historical maps. These 13 line drawings will help armchair generals understand the exact situation. Six charts near the rear of the manual explain the behind-the-scenes combat calculations for the edification of advanced computer gamers. They are also reproduced on the back of a laminated grid map that comes with the disk.

The back page of the documentation contains a summary of the commands used throughout the game. This is quite helpful and prevents the instruction book from becoming dog-eared.

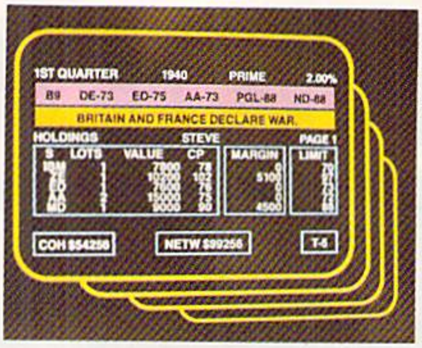
The battle itself is not the most exciting fought during the Civil War, but SSI's game system is without major flaw. *Gettysburg: The Turning Point* is highly recommended.

Strategic Simulations, 1046 N. Rengstorff Ave., Mountain View, CA 94043 (phone: 415-964-1353).

—Rick Teverbaugh

THE FINANCIAL TIME MACHINE
Insight
Commodore 64
Disk; $34.95

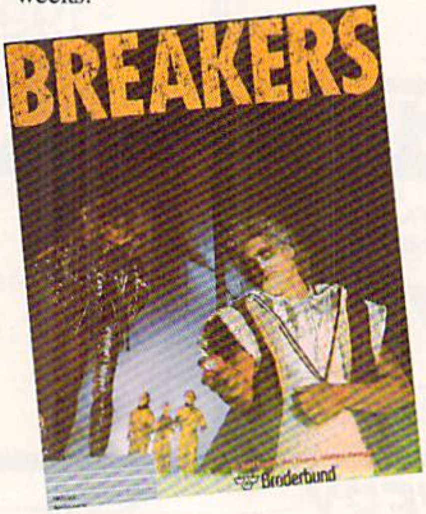
For all those folks who have previously refused to consider the Wall Street simulation as a viable subject for computer entertainment, we submit for your approval *The Financial*



Financial Time Machine: ***a smart buy.***
READER SERVICE NO. 284

Time Machine. Here's a program that might aptly be described as "trading on the floor of the Twilight Zone," an imaginative contest that gives new meaning to the word speculation.

The player begins by selecting a date between 1930 and 1984. The documentation suggests 1939 as a good starting point, because it is a period rich in political turmoil and a great time to buy into the burgeoning military-industrial complex. The player then labels each of four portfolios according to an intended strategy: long-term growth, income growth, short-term trading, option trading. The program automatically updates these portfolios and allows the user to see the impact of living history on each of the four financial strategems. The computerist can enter the "jump" mode, a fast-forward feature which offers a picture of the developing market during the next 52 weeks.



Everything has a purpose in **Breakers.**
READER SERVICE NO. 285

The Financial Time Machine then offers the investor the chance to dabble in any of 27 real stocks, as well as mutual funds, T-bills, gold, and bonds. Six data screens track such features as put and call options, margin buying, a Stop Loss command, broker commissions, and taxes.

A complete game runs five years. Players can save a game in progress to disk after each year.

Two tickers dominate the main screen. The first represents the investment portfolios of the one-to-four speculators, while the second lists world events as they occur.

Throughout the game, a player can employ the "jump" mode to vault forward a year at a keystroke in order to see how time and its events have enriched or depleted each of the four portfolios.

The integration of stories relating to famous sporting events and pop cultural landmarks with more significant news items gives the passage of years a texture which is lacking in most financial simulations.

The Financial Time Machine is an inspired creation, a game that is both educational and remarkably entertaining. The basic financial simulation is quite strong, but it's the element of time travel that makes this program truly compelling. And should the past prove too predictable, it is even possible to play this game in the future, where events like the Russian tracking of an alien spaceship provide a new universe of potential windfalls and disasters.

Insight/Lehner Communications, 2708 Arlington Ave., Highland Park, IL 60035 (phone: 312-432-5458).

—Bill Kunkel

BREAKERS
Broderbund
Commodore 64
Disk; $34.95

The packaging of this text adventure immediately grabs the gamer by the lapels. In big letters on the back of the box it says, "They're expecting the Messiah any day now. If you're not him, you better have a real good story." If that doesn't quicken the pulse of even the most jaded compu-

terist, nothing will.

Another quote from the game box: "Breakers. The kind of desperate misfits who give cheap bars and dark alleys a bad name. And the worst part is, they aren't even the worst part." That's the flavor of *Breakers;* slightly irreverent, slightly tongue-in-cheek, and outrageously enjoyable.

The 83-page book which comes with this text adventure is not so much a manual as a survival kit. *Breakers* isn't one of those electronic novels which the player can boot blind and figure out as play progresses. Even highly experienced adventurers are unlikely to survive without at least skimming the manual.

There is a minimum of wasted space or text in *Breakers.* Almost everything has a purpose, even if that purpose is only to make life more difficult for the gamer.

Timing is of utmost importance in the game. For instance, while in the Breaker bar, there is an opportunity to talk to Bobo. Loan her money or tell her a lie, and you'll get nowhere. A player who speaks truthfully and offers her a quick deal ends up with a VBX that will help steer clear of the Gaks. (Remember we said Breakers weren't the worst.)

Patience is also a virtue. Even when the program gently chastises the player about waiting, a quick decision can sometimes throw you completely off the track.

Since almost nothing that happens on Slug Nebula or Borg has any earthly equivalent, a little mental preparation is not amiss. The best *Breaker* player is the one who can temporarily cut the ties to reality and plunge completely into the world of the game. It would also help to be a science fiction fan.

Among the strengths of *Breakers* is the BTZ language parser. It not only comprehends more words than almost any other parser, but it understands why it doesn't understand when player input goes beyond its vocabulary. The program generally emits explanations useful in framing more intelligible commands.

Interacting with the colorful characters in the game is almost as much fun as solving the puzzle. When there is only one character in your area, you need only put a statement inside quotation marks to address him or her. Otherwise it is necessary to precede the actual message with the name of the character to whom it is addressed.

Another strength of *Breakers* is the intelligence of the characters themselves. They learn as your character learns. They will remember their last encounter with you and won't forget past kindness or injustice.

The world of *Breakers* isn't static. Just because a big Gak gave you a hard time at a certain location the first time you showed up doesn't mean he'll still be there.

Here are a few hints to get off to a good start.

1. Beekanavskemich might seem like a dull-witted barroom fixture, but don't ignore him. Answer a couple of his riddles correctly, and you'll get some valuable tools.

2. Answer "yes" to a lot of questions, even if you don't know the answers. In some cases, a well-disguised bluff can get you through a tight situation.

3. Don't leave the bar without the VBX, or the less than hospitable Gaks will stop your character cold.

It is also advisable to have a blank formatted disk ready to save the game. Even if provided with all the clues necessary to march right through the game, it would likely take more than one sitting. Without such a blueprint, it could require several months of regular playing to get to the bloodstone, firestone, waterstone, and the end of the game.

Breakers is low on action, but high on strategy. The computerist can look forward to many absorbing hours of play in this luridly colorful world.

Broderbund Software Inc., 17 Paul Drive, San Rafael, CA 94903 (phone: 415-479-1170). ***–Rick Teverbaugh***

BATTLEFRONT
Strategic Studies Group
Commodore 64
Disk; $40.00
(See illustration on page 41)

Just when it appeared that Strategic Studies Group had reached the limit that could be achieved in 64K with a war simulation, along comes *Battlefront.*

In the simplest terms, *Battlefront* is a World War II corps-level land combat game. But stopping the description there would be like calling the Mona Lisa a portrait of a moonfaced lady.

The first two SSG historical combat simulations were *Carriers at War* (World War II naval) and *Europe Ablaze* (World War II aerial). Both reaped applause and awards at nearly every turn, and rightfully so. While neither is an entry-level game, either can be grasped quite easily by the experienced gamer and, eventually, even the novice. Both of them received high marks for execution and for the versatility of the scenario-creation utilities which are included on the disk.

After *Europe Ablaze*, the next title was supposed to be *The Road to Appomattox*, a grand scale Civil War

program. Evidently, SSG decided that it was more logical to complete its World War II trilogy with a land combat simulation before moving on to another subject.

Carriers and *Europe Ablaze* were good, but it can now be said without fear of contradiction that the third time is the charm. *Battlefront* is easily the finest wargame currently available for any computer system.

It is possible, using the system utilities, to take virtually any World War II board game and convert it into a *Battlefront* scenario. But let's look at the four highly enjoyable scenarios provided with the game before tackling the construction program.

As commander of the German forces in "Crete," the objective is to rid the playfield of Commonwealth forces in seven days. There are four turns per day: a.m., noon, p.m., and night. Taking the Commonwealth side is a battle of survival; inflict maximum damage and stay alive.

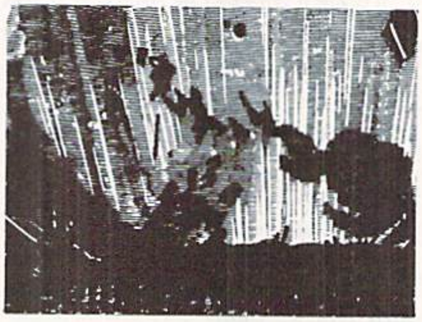
Battlefront allows two armchair generals to play head-to-head, or a single participant can assume command of either side against a computer-controlled enemy.

The second outing is "Stalingrad." Armed with two Panzer divisions, the Germans must rescue the 6th Army, which is stranded in the Russian city. The Soviets must protect the northern objectives and prevent the Nazi forces from linking together.

The "Saipan" scenario is a battle of defense versus offense. The Japanese forces try to hold the southern objectives as long as possible and delay the U.S. Marines' northward progress by taking strong defensive stances. Offensive pressure is the name of the game for the U.S. This minigame could easily serve as a training ground for any wargamer who wants to improve facets of his or her play-style.

The fourth scenario is "Bastogne." The action generally boils down to a German assault battering the U.S. defense, followed by a counterattack against the city of Bastogne.

After the players choose the field of battle, the program offers the opportunity to adjust the qualitative balance between the opponents. The way that handicap is handled is one of *Battlefront's* finest features. It changes the multiplier on victory points accumulated by either player without affecting the combat performance or the artificial intelligence of either side.



Each player can have a total of 60 battalions composed of 14 different types of units. The hexagon-gridded battlefield can be a maximum of 39 × 28 in size. The scale is about 1 km per hex.

But the real beauty of the game is its menu-driven simplicity. There are 20 different menus, and, admittedly, they aren't easy to learn. The manual presents the menus in numerical order, which isn't the best way to learn them, but it does make the explanations easy to find when a gamer wants to check a rule during play.

Using the menus, it is relatively easy to maneuver and deploy the battalions, send them into the fray, and withdraw them when necessary. As Corps Commander, the gamer issues general orders to each regiment. Unlike many wargames in which there is direct control over the movement of each battalion, the Corps Commander can only outline an objective or point out the enemy. How that order is carried out rests with the abilities of lower level commanders. It is a frustrating, yet extremely realistic way to run a war.

Air strikes or naval bombardments are incorporated in a relatively abstract manner through use of support points. The only exception to the indirect control which prevails in *Battlefront* is the movement of divisional headquarters. These HQs are important because they control how efficiently supplies and replacements are delivered. The location of the headquarters units is the major factor in efficiency of troop movement. They are the only pieces that can be sent to a particular hex on the grid.

Active regiments are in a "Ready," "Contact," or "Engaged" state. Engaged means that the troops are actually fighting the enemy. Contact means that the unit is in close proximity to an enemy. Otherwise, a unit is Ready. In the "Ready" mode, it can be put on reserve, which gives it a chance to be resupplied and recover from fatigue.

There are four types of actions possible for a unit which is in the "Contact" or "Engaged" mode, including launching an attack.

Another unique feature is the casualty level report. The percentage of ineffective troops includes not only the killed and wounded, but those soldiers who are no longer willing or able to continue the fight. Many aren't exactly hurt, but might be out of contact, cut off, confused, pinned down, or maybe just leaderless.

Most games of *Battlefront* last about 40 turns. That's about 90 minutes against the computer or two hours with a human foe.

The same utility which allows the user to create new battles also provides a way to extend a game beyond the maximum 16 game-days. It is possible to save a game on disk, and then use that information to create a new scenario that starts right where the old battle ended.

It isn't easy to concoct scenarios without a thorough knowledge of *Battlefront*. To that end, SSG is putting out a quarterly magazine called *Run 5*. Ready-made scenarios for all three military simulations can be entered directly into the design utility and are available on disk. Three issues have appeared so far.

Even without this excellent support, *Battlefront* would be a landmark computer military simulation. No wargamer can afford to miss a trip to this *Battlefront*.

Strategic Studies Group, 1747 Orleans Court, Walnut Creek, CA 94598 (phone: 415-932-3019).

—Rick Teverbaugh

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Reader Service No. 119

BASIC AHOY!

For the C-64

By Carlos de la Guardia

BCOL

Assigns colors to background color registers 1, 2, and 3. Format is BCOL c1,c2,c3.

BIN

Returns the decimal value of an eight-bit binary number. The argument must be enclosed in quotes. Example: A=BIN ("11110000").

BUMP

Returns the collision status of any sprite. It returns a 0 if the sprite is not colliding, a 1 if it is colliding with another sprite, a 2 if it is colliding with a character, and a 3 if it is colliding with both. Example: C=BUMP(n). Note that n must be a number from 0 to 7.

CHAR

Any character's shape can be changed using this command. Using the format CHAR sc,ln,ch will change the line (ln) (0-7) of character sc (sc represents the screen display code) to the bit pattern of ch. Example: CHAR 1,0,255 will change the uppermost line of the character "A" to a solid line.

CLS

Clears the current screen. If an argument of 1 is used it clears the current window.

COLOUR

To set the colors for the border, background, and text. Format is COLOUR bd,bk,tx.

CSET

Controls which 2K block of the eight available is used for the character set. The blocks are numbered 0-7. Format is CSET bk.

CURSR

Equivalent to PRINT AT. Format is CURSR x,y,exp where x is the column (0-39) to start printing, y is the row (0-24), and exp is any valid numeric or string expression.

DOWNLD

Copies the uppercase character set to one of the eight possible 2K blocks. Format is DOWNLD bl where bl is the block at which the character set will be copied.

ENVELOPE

Defines a musical envelope. Format is ENVELOPE n,a,d,s,r,w,p where n is the envelope number (0-9), a is the attack rate (0-15), d is the decay rate (0-15), s is the sustain rate (0-15), r is the release rate (0-15), w is the waveform (17-triangle, 33-sawtooth, 65-pulse, 129-noise), and p is the pulse width (0-4095).

FCOL

Fills the current window with any color. Format is FCOL c.

FILL

Fills the current window with any character. Format is FILL ch where ch is the screen code of the character.

FLIP

Determines which 1K block of the four available is used for the text screen. The blocks are numbered 0-3. Format is FLIP pg where pg is the number of the screen you wish to use.

HOME

Homes the cursor. An argument of 1 will place the cursor at the start of the current window.

JOY

This function returns the position of the joystick. Example: J=JOY (p) where p is the port (1 or 2) you wish to read. Possible values are:

0: none pressed	6: down/left
1: up	8: right
2: down	9: up/right
4: left	10: down/right
5: up/left	16: fire

MODE

Selects graphics mode. Format is MODE m where m is 0 for normal text mode, 1 for multicolor text mode, 2 for extended background text mode, 3 for bit-mapped graphics mode, and 4 for multicolor bit-map mode.

OFF

Turns selected sprite (0-7) off. Example: OFF s.

PAUSE

Delays program execution from 1 to 65535 jiffies (60ths of a second). An argument of 0 causes the program to halt until a key is pressed. Format is PAUSE jf.

PLACE

Places the selected sprite (0- 7) at the specified x,y coordinates. Format is PLACE n,x,y where n is the sprite number, x is the coordinate (0-511), and y is the y coordinate (0-255). Only x coordinates 24-319 and y coordinates 50-229 are completely visible on the TV screen.

PLAY

Plays a string of music using the following notation:

On: octave (n= 0-7)	Tn: envelope (n= 0-9)
Vn: voice (n= 1-3)	A,B,C,D,E,F,G: notes
[shift note]: sharps	R: rest
	H: half note
W: whole note	I: eighth note
Q: quarter note	[shift dur]: dotted note
S: sixteenth note	

Example of PLAY command: PLAY "V1 T3 O4 Q CDEFGAB". This plays a scale using voice 1, instrument 3, octave 4, and quarter notes.

PLOT

Plots a point onto the high-resolution screen. Format is PLOT x,y,m where x is the x coordinate (0-319) of the point to be plotted, y is the y coordinate (0-199), and m is the plot mode (0-erase, 1-draw).

PRTY

Sets the foreground priority for the selected sprite (0-7). Format is PRTY s,p where s is the sprite number and p the assigned priority. If p is 0 the sprite will appear in front of the foreground. If p is 1 the sprite will appear behind the foreground.

QUIT

Turns *BASIC Ahoy!* off. Note that this command erases the program in memory.

RASTER

This is one of the most powerful commands offered by *BASIC Ahoy!* It sets up a raster interrupt routine that allows mixed modes to appear in three sections of the screen. This routine changes four key locations during each of the three interrupts. The affected locations are control register 1 (53265, $D011), control register 2 (53270,$D016), the memory con-

If you program frequently in BASIC and like to use fantastic Commodore 64 graphics and sound features, you certainly know the drawbacks: the lack of speed and the nightmare of PEEKs and POKEs.

Of course, there are lots of machine language routines that help to access these features, but after you have typed the ones that you need, you end up with five or six programs on disk or tape and dozens of SYS addresses to remember.

That's why I wrote *BASIC Ahoy!* It is a powerful utility which adds 31 new commands to BASIC 2.0. It works by changing the BASIC indirect vector table to point to new program handling routines, which check for the new commands.

Since it is written entirely in machine language, you will need *Flankspeed, Ahoy's* machine language entry program (see page 111), to enter *BASIC Ahoy!* Just give 9000 and 9FF0 as starting and ending addresses respectively, and you will be ready to enter the program. Once finished, save a copy to disk or tape. Now reset your computer and type LOAD "BASIC AHOY!",8,1 for disk or LOAD"BASIC AHOY!",1,1 for tape. To start, enter SYS 36864: NEW.

The introduction screen will appear and you will be ready to use the new commands, described in the table.

USING BASIC AHOY!

Programs written with *BASIC Ahoy!* will load and save normally. Please note that they will only function properly if *BASIC Ahoy!* is activated. Also, when using *BASIC Ahoy!*, screen memory is relocated to 32768, so use this number if you want to POKE to the screen. Keep in mind that if you use the FLIP command screen memory will also change. *Ahoy! Disk* subscribers who have trouble with any of the commands can look at the *BASIC Ahoy!* demonstration program included on January's disk (too long, unfortunately, for inclusion in the listings section of this magazine).

Using *BASIC Ahoy!* you can create your own graphics programs with much more ease than if you had to calculate all the PEEKs and POKEs. This lets you concentrate on creating exciting games or professional looking programs. It would be a great idea for you to send your best efforts to *Ahoy!* magazine so that a library of *BASIC Ahoy!* programs can be started. ☐

SEE PROGRAM LISTING ON PAGE 123

trol register (53272, $D018), and background color 0 (53281, $D021). The format for the RASTER command is RASTER l1,l2,l3,b1,b2,b3,x1,x2,x3,y1,y2,y3, m1,m2,m3 where l1 is the scan line at which the first interrupt will end, l2 is the scan line at which the second interrupt will end, l3 is the scan line at which the third interrupt will end, b1,b2, and b3 are the values that will be stored at the background color register during the first, second, and third interrupts respectively, x1,x2, and x3 are the values to store at control register 1, y1, y2, and y3 are the values to store at control register 2, and m1,m2, and m3 are the values to store at the memory control register. The following table should prove useful to get the values to use at control registers 1 and 2, and the memory control register:

REGISTER	VALUE	EFFECT
Control Register 1	27	Sets normal text mode
	59	Sets high-resolution mode
	91	Sets extended background mode
Control Register 2	8	Sets normal color mode
	24	Sets multicolor text or multicolor bit-map mode
Memory Control Register	4	Selects uppercase/graphics character set and screen 0
	6	Selects lower/upper case character set and screen 0

REPEAT

Used to toggle the repeat key function. When *BASIC Ahoy!* is started, only the space and cursor keys repeat if held down. Entering REPEAT enables this feature for all the other keys. Typing it again turns it off.

SCROLL

To scroll the current window in any direction. Format is SCROLL d,m where d is the direction (1-right, 2-left, 3-up, 4-down) of the scroll, and m is the scrolling mode. If m is 0 the window blanks; if m is 1 the window wraps around.

SPRITE

To define different sprite parameters. Format is SPRITE n,b,c,e,m,c1, c2 where n is the sprite number (0-7), b the 64-byte block of memory at which sprite data is located (0-255), c the sprite color, e determines the size of the sprite (0-normal size, 1-double width, 2-double height, 3-double size), and m is the sprite mode (0-high-res, 1- multicolor). c1 and c2 are the sprite multicolor registers and are only needed when m is 1. *Do not* use sprite blocks 64-127, because that's where *BASIC Ahoy!* resides.

TEMPO

To define note duration. Format is TEMPO d where d is the duration of a whole note expressed in jiffies. The values of d can range from 0 to 255.

VOL

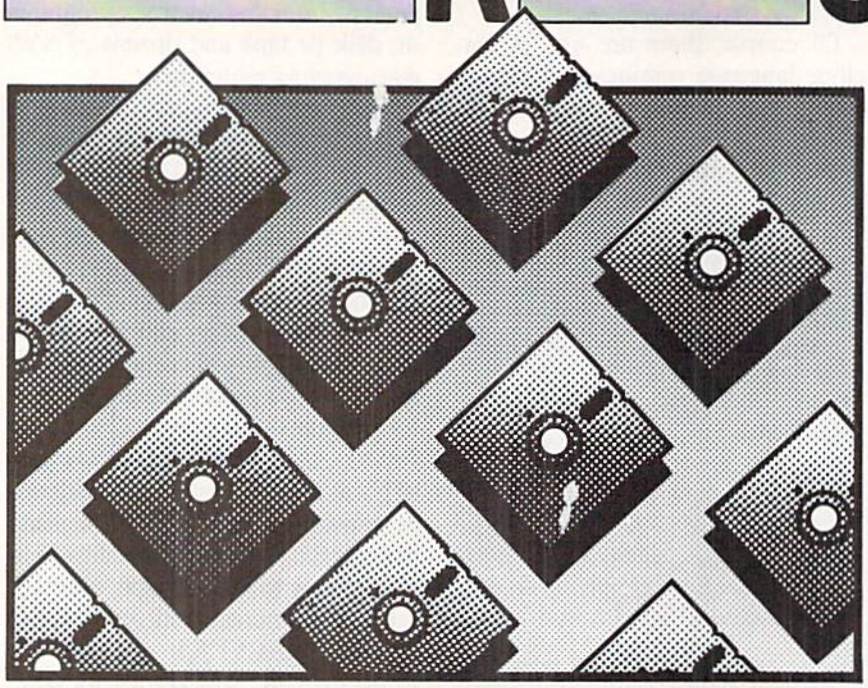
Sets the master volume. Format is VOL v where v is a number from 0 to 15.

WINDOW

Defines a window's size. Format is WINDOW x,y,x1,y1 where x and y are the coordinates of the top of the window and x1 and y1 are the coordinates of the bottom. Note that x and x1 values range from 0 to 39 and y and y1 values range from 0 to 24.

WIPE

To clear the high-resolution screen. This screen is located behind the BASIC ROM at 40960-49151.



JACK TOM

1571 CLONE MACHINE

Micro-W. Distributing, Inc.
Commodore 128
Disk; $49.95

It has been nearly three years since *Clone Machine* for the 1541 disk drive made its debut. At the time it represented a revolutionary new utility for the C-64 and the 1541 disk drive. Although marketed as a copy program, it was far more than that as it offered a complete collection of disk utilities which let the user conveniently examine and modify the contents of a Commodore-formatted floppy disk.

Shortly after the introduction of *Clone Machine,* Micro Ware (now Micro-W., as it seems someone else had the name first) Distributing offered an upgrade utility for *Clone Machine* known as *Unguard.* Commodore users were astonished! For the first time a utility was available which let the average user reproduce the bad sector copy protection schemes being used at the time by commercial software producers. Of course, by today's standards, *Unguard* was clumsy, time consuming, and probably responsible for more misaligned disk drives than anything else conceived by the mind of a 1541 programmer. Nevertheless, the program was an astounding commercial success. It did the job, and for a few months had no competition in the field of commercial copy programs.

Since that time tremendous advances have been made in the field of Commodore disk copy protection and the programs which are designed to get around it. However, for those of us who experienced these events, the original *Clone Machine* still holds a special place in our hearts. In spite of all the improvements in copy protection, we find that nothing has significantly surpassed the usefulness of the basic disk utilities supplied with the original *Clone Machine.* In fact, we find its original track and sector editor still to be our favorite, mainly due to the neat and logical layout of its screen display.

Thus when Lou Ploch of Micro-W. told us last spring that his company would be offering a new version of *Clone Machine* for the 1571 disk drive, we were more than eager with anticipation. The 1571 is an amazing machine with powers and abilities never before found on a Commodore disk drive. We knew it would be able to do marvelous things to a floppy disk once the proper utility was made available.

After several weeks the first sample of *1571 Clone Machine* arrived. Unfortunately, we were unable to boot the program, as it turned out that there was more than one version of the 1571 disk drive (at least internally) on the market. What followed was a brief interval of anxiety as Peter Patel, the brains behind this package, tracked down the idiosyncracies which were hounding his work. When the program was finally up and running we were not disappointed. *1571 Clone Machine* makes it easy to access virtually all of the 1571's unique features.

However, this was only the start. Peter told us of some of the improvements to the package which were nearly done. He also took to heart some of our casual comments and promptly incorporated them into the program. As a result we held off reviewing *1571 Clone Machine* till version 2.0 was in our hands.

As with the original *Clone Machine,* the 1571 version is far more than a simple copy program. In fact, all of the original *Clone Machine's* basic disk utilities for the 1541 are still available as one small part of the overall package. Of course the original *Unguard* is not to be found, as that utility has been replaced by far better things.

All of the package's features are accessed by a series of menus which lead the user to the intended goal. If you happen to stray down the wrong menu path you will always have the option of returning to the beginning. However, once a final selection is reached, a reboot will be necessary. This is easy to do with the C-128's reset button and the program disk's autoboot routine. The opening menu displays four main groupings which we will now examine. The program also offers menu haters a way to go directly to their favorite utility.

The Copiers

The Copiers section offers either CBM (or GCR for Group Code Recording) or MFM (Modified Frequency Modulation). GCR is the disk

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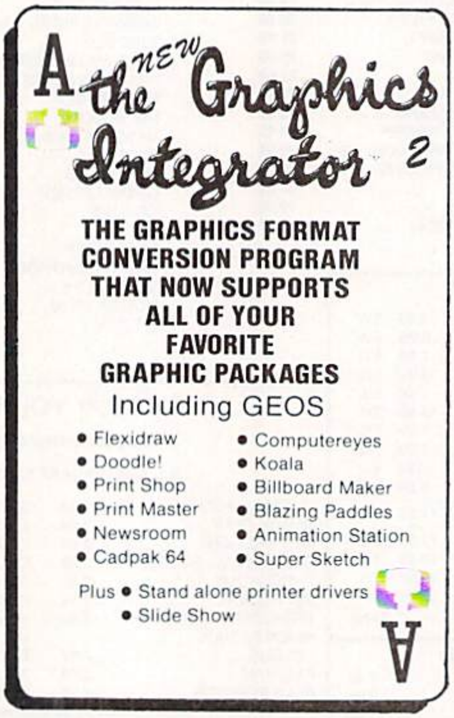
recording scheme used by Commodore for all its 1541-type disk drives. MFM is the recording method used by nearly all the rest of the world. In particular it is the method used by most CP/M systems, as well as the IBM PC.

If you select MFM you will be prompted through an automated procedure which analyzes the original program disk, determines its particular MFM format (number of sides, tracks per side, sectors per track, and bytes per sector), and copies the disk. Thus you may copy original CP/M and IBM PC formatted disks, in their original format, on your 1571 disk drive with a C-128 computer.

If you select CBM a second menu with four options will appear. The first two choices are between copiers for protected or unprotected disks. The second two are the file copy utility, the Side Flippers.

The Side Flippers will be of special interest to users upgrading from a 1541-based system. These utilities let you copy from one side of a double sided 1571 formatted disk to the other. This is very handy for converting "flipped" 1541 disks to double-sided 1571 disks. You will still have the equivalent of two single-sided disks when you are done. However, you will no longer have to flip the disk, or cut a second write protect notch, to make the copy. The same utilities can be used to reconvert a 1571 double-sided disk to 1541 single-sided format. Note that the *Side Flippers* include a fast nibbler to let you back up many protected programs by "back-siding" them to other disks without creating a flippy.

Among the protected copiers you will find five additional choices. These include a Fast Nibbler, a GCR Nibbler, a Header Nibbler, a Multiple Density copier, and a Single Track Copier. All of these copiers may be customized to some degree by user-entered parameters. We



haven't the space to go into the technical details of each of these terms, as most require an intimate knowledge of the GCR disk format. However, true disk hackers should immediately recognize their worth. If you wish to learn more about the intricate details of disk formats, a comprehensive introduction may be found in the manual which accompanies *1571 Clone Machine.* We also recommend, once again, *Inside Commodore DOS* by Immers and Neufeld for a thorough treatment of the subject.

The unprotected copiers offer a burst copier and a sector copier. The burst copier is included as a reasonably fast copier, which will be immune to 1571 ROM changes, as it uses the standard 1571 burst commands as documented by Commodore. The sector copier is slow, but very reliable, and will work with both the 1541 and the 1571. It requires a preformatted disk, which may be done automatically, and it can be used to copy selected tracks. The unprotected copiers are the only utilities which will work with two 1571 disk drives.

Utilities

This selection on the main menu offers you eight additional choices. The first is *Disk Doctor 128,* a full-featured, public domain track and sector editor for the 1571 disk drive (GCR format only). *Disk Doctor* is a very comprehensive sector editor with a separate 11-page section section in the manual devoted to its operation. We were slightly disappointed by its inclusion, as we were hoping to see an updated version of the original *Clone Machine's* track and sector editor. In particular we would have liked to see a version which took advantage of the C-128's 80 column display to show both the hexadecimal and ASCII values of all 256 bytes in a disk sector. Nevertheless, *Disk Doctor* is worthy utility with versions



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available for the VIC 20, C-64, and of course the C-128.

Disk hackers will find a sophisticated *Track Analyzer* in the utility grouping. This accepts a track number, side, and bit density as input. In return it reports on the number of sync marks it finds and proceeds to display the header bytes associated with each sync mark. Both the GCR data and the corresponding hexadecimal values are shown. Note that ten GCR bits translate to a single eight bit data byte. The *Track Analyzer* can be used to determine the type of copy protection which may have been employed on the original disk. This information can be used to guide you to the proper GCR copier to use.

The manual describes several controls available with the *Track Analyzer*. One of these is a link to the C-128's built-in machine language monitor (MLM). What the manual fails to mention is that the *Track Analyzer* stores the entire contents of the track under analysis in a buffer area starting at $02000. By entering the MLM you can browse through the data which is still in the original GCR format as it is recorded on the disk. This means that ten bits in the buffer will translate into a single data byte, or every five bytes on the display are only four data bytes from a disk file.

A conventional error detector is also included in the utility menu. It analyzes and reports all standard DOS errors. Standard DOS errors were used extensively in early forms of copy protection. This version of the error detector runs a bit slower than other versions we have come across, but it is still handy to have around.

The next utility lets you bulk erase an entire disk. This clears the disk of all prerecorded data, including the formatting data. You might try this on disks which stubbornly refuse to accept a formatting.

Two C-128 autoboot utilities are included. These use the C-128's ability to automatically LOAD and RUN a program based on the contents of track 1, sector 0 on the disk. The first version of this utility configures the disk to autoboot a C-64 program. The

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The publisher cannot assume responsibility for errors in the above listing.

second version results in a C-128 autoboot. Either version lets you select the program which will be run by the autoboot.

As we mentioned above, the next selection on the utility menu brings up all of the original *Clone Machine's* disk utilities in C-64 mode. Those users who have upgraded from the 1541 can easily indulge in a nostalgic trip.

The last utility lets you exit the C-128 to C-64 mode with RAM bank 1 active. You may then load up a program and hit the C-128's reset button while holding down the RUN STOP key. This will bring you back to the C-128's built-in machine language monitor with the entire program intact in RAM bank 1. Only the top 256 bytes and the first kilobyte of RAM will be altered from their original state.

Disk Commands

This section contains a collection of useful items. There are separate displays of the disk directory of either side of the disk, for back-sided disks which may have been created by the disk flippers. There are also commands for scratching, renaming, and combining files, as well as validating the entire disk. Note that these last four functions are standard Commodore DOS commands which have been included for convenience.

The most interesting function in this grouping is the Format utility. This provides the expected options of formatting in 1571 double-sided format or individually formatting each side of the disk. It also lets you do an MFM format. This is the disk format used by most CP/M systems. Since there are many variations to the MFM format, you will have to provide several parameters. These include more familiar parameters such as the number of sides, the number of tracks per side, the number of sectors per track, and the number of bytes per sector. You will also have to come up with things like the interleave and a fill byte value. The manual includes the proper statistics for Osborne, Kaypro II, and IBM PC formatted disks.

Expansion Module

When all else fails, simply call up the expansion module. Here will be found specific instructions and copy routines for duplicating specific programs. Our copy of *1571 Clone Machine* came with over 50 parameter files, not a very large amount by today's standards. However, we understand that this number has grown considerably since we received our last update. We expect that the total number will have increased even further by the time you read this.

Conclusion

In the form of *1571 Clone Machine*, Micro-W. has published a worthy successor to the original. Once again we have a full-featured disk drive utility, for the 1571, for the 1571 in this case, which has yet to be matched by any other commercial program. In particular, the inclusion of the *Side Flippers*, the MFM formatters, and the MFM copiers makes this a worthwhile package. On the other hand, if you are looking for a plain and simple copy program for duplicating protected software, you may be disappointed. Although the array of copy and analysis tools are more than the equal of any form of copyable copy protection, they will require more work for their complete mastery than you may wish to invest. Of course some sacrifice in automation has always been the price of operational flexibility.

Micro-W. Distributing, Inc., 1342B Route 23, Butler, NJ 07405 (phone: 201-838-9027). *—Morton Kevelson*

KRACKER JAX

Computer Mart
Commodore 64
Disk; $19.95 per volume

Whatever your interest in Commodore computing, sooner or later you will purchase commercial software. At that time you will most likely find yourself at odds with the interests of the software's publisher. The chances are that you will not be able to create a backup of your disk-based program due to the copy protection placed there by its manufacturer.

Copy protection has become an accepted fact in the software industry. The relative fragility of the floppy disk as a data storage medium is an equally accepted fact. Thus it is no surprise that commercial copy programs always find themselves a ready market.

Most archival copiers use the brute force method of backing up protected disks: simply reproduce the original, complete with protection, programs, data, and all. This approach worked well for most early forms of copy protection which consisted primarily of easily reproducible disk "errors." As copy protection became more sophisticated, so did the copy programs. Most advanced copiers now include several versions for coping with different types of protection. However, protection exists that cannot be duplicated by a Commodore disk drive. For these types only a parameter copier will do.

Table of Interesting Statistics Regarding the Contents of the *Kracker Jax* Disks

	Vol. 1	Vol. 2	Vol. 3
No. of Standard Parameters	82	104	101
No. of Special Parameters	8	0	3

The parameter copier makes use of the foreknowledge obtained from a careful analysis of a program's copy protection. The parameters consist of no more or less than a detailed set of instructions which when properly applied simply neutralize or modify the program's copy protection, making it amenable to duplication by conventional methods.

Although reminiscent of candy coated popcorn, *Kracker Jax* is not edible. However, each package does contain many surprises. *Kracker Jax* relies entirely on a set of program parameters to perform its duplicative tasks. The *Kracker Jax* parameters offer the added advantage of purging the copy of all protection.

Each *Kracker Jax* package (there are three volumes as of this writing) contains a three-minute single drive backup utility and a collection of parameters. The three-minute backup program duplicates an entire 1541 disk in three passes. In the process it reports on all errors as they are encountered. However, none of the errors are reproduced on the copy. Thus the three-minute backup is a useful utility on its own if you have not already acquired one. Actually, the backup program is the same one provided with Di-Sector by Starpoint Software.

To use *Kracker Jax*, simply boot the program and follow the onscreen prompts. The first step is to make copies of all the protected disks with the three-minute backup. The second step is to reboot and select the appropriate parameter from the menu. The reboot may be avoided by simply selecting the parameters from the directory and loading in the usual way.

All of the parameter files are brief programs written in BASIC. Thus they are all available for the analysis of their respective copy protection schemes. However, you will require a fairly sophisticated understanding of the DOS and machine language to benefit from this information. The working commands in a parameter file are no more than a series of block reads and writes which change specific bytes of the program disk.

Kracker Jaxed programs acquire certain useful characteristics. The resulting copies are completely free of copy protection and may be subsequently duplicated by just the three-minute copier. In effect, each parameter file on the *Kracker Jax* disk is a one-shot proposition, as once used it will no longer be needed. Whenever possible the resulting copies contain only standard Commodore disk files in listable directories. This means that if and when a low-cost, usable hard disk drive should become available for the C-64, a *Kracker Jaxed* program should be readily transferred to it. In general original copy protected programs cannot be transferred to hard disk drives.

In addition to the "standard" parameter files, several "special" parameters are included with each disk. These parameters are special in that the original program disks cannot be copied by the included three-minute backup program. Instead a "nibbler" utility is required to copy the originals, after which the included parameters may be successfully applied. *Kracker Jax* recommends *Fast Hack'em* by Basement Boys Software (see review in the Oct. '85 *Ahoy!*) or *Di-Sector* by Starpoint Software.

We now come to the part you have all been waiting for. Just what program parameters are included on each of the *Kracker Jax* disks? You may release your collective breaths, because we are not going to tell you. For one thing, there is just not enough room to list all the names with this review. Besides, we have some qualms with regard to the ethics of providing such a listing. We have provided a Table of Interesting Statistics regarding the contents of the *Kracker Jax* disks. If you require greater detail, write or call the manufacturer. Note that *Kracker Jax* promises to release update volumes quarterly.

Kracker Jax is also offering *Kracker Jax Revealed/Book One* (not reviewed). This $19.95 package will contain a book with a detailed description on how the parameters for 20 popular titles were created, machine language monitor, sector editor, error scanner, and an expansion port reset switch.

Computer Mart, Dept. A, 2700 NE Andreson Road, Vancouver, WA 98661 (phone: 206-695-1005).

—Morton Kevelson

GNOME KIT

Briwall
Commodore 64 and 128
Disk; $39.95

Gnome Kit is a potpourri of BASIC, DOS, and machine language (ML) programming aids for the 64 and 128. Though almost every function can be found elsewhere in one form or another, *GK* provides the advantages of a single source approach: convenience and expediency. Just consider it

an anthology of programming utility hits.

The program's hype claims it will triple programming capabilities and cut coding time in half. Such marketing claims must be taken with a grain of salt. Almost every software publisher makes them, almost none back them up with scientifically conducted research surveys. Whose capabilities will it triple; who will it make go faster, Jim Butterfield, you, the hacker next door? These claims are relative, remember that.

If *Gnome Kit* had an astrological sign it would no doubt be Gemini, the Twins. Its multifaceted personality is intentional, a result of supporting the 64 and the 128. Besides working with the standard 64 features, it takes advantage of the 128's uniqueness. We're not talking numeric keypad and HELP key support either. *Gnome Kit* allows input of 8502 machine code, handles BASIC 7.0, and supports all 128 memory banks, to name a few.

The unprotected disk contains 64- and 128-specific program examples. Such learning aids are usually valuable get-acquainted tools for all concerned. The manual refers to and makes use of them repeatedly; it even lists the 64 version in one of the exercises. Unfortunately the review disk's 128 example suffered from a syntax error. It was no help at all.

Another aspect of the dual personality comes to light when you try to load all options simultaneously. It won't work! The DOS facility can't coreside with the BASIC/ML module. Try to force the issue and the program crashes.

Read the User's Guide??!!!

Briwall recommends you read the entire manual from cover to cover. That is sound advice, as the functions do not necessarily operate on an intuitive level. Some are straightforward, others are not. This is particularly true in the ML module, a place where only experienced programmers should tread.

The manual was evidently written by a hacker for other hackers. This

is fine for those who've already cut their teeth, but it leaves something to be desired for the recent Commodore inductees accustomed to thoroughly proofed and professionally produced materials. It lacks a terms glossary, index, and screen shots (for ease of learning). Even worse, listings are not provided for all example programs. If they had been, failure of the 128 example would not have been so damaging.

Something else saves the manual from a fate worse than a reviewer's condemnation: the information is all there. Even if it's not the easiest to find, it's there.

A pullout quick reference card containing 99.99% (or thereabouts) of the commands helps offset the manual's faults. A short description accompanies each command. They are even grouped logically: programming aids, debugging aids, and DOS/disk commands. The card is better organized than the manual. It's also more concise.

There's No Place Like Gnome?

The 128 version does not autoboot! Why not? There's no (good) reason. Users have a right to demand the basics from every program they purchase. While this utility is not overpriced, it's not unique either. If Briwall is as technically competent as they want us to believe, they can insert an autoboot routine.

Both the 64 and 128 versions can be deactivated by typing ".X". SYS calls reactivate them without the need to reload. 128ers can even use f8 to activate the SYS call. That's better.

Unlike BASIC 7.0, the auto (line) numbering command is in force at all times. Just start the line in the second column and *GK* does the rest. Delete and trace work about the same, while *Gnome* also offers variable dumps—simple floting point, integer, and string, as well as all array elements. If there are no variables, it returns a null set message.

The renumber and merge commands make subroutines and program modifications a dream come true. The ability to designate renum-

ber ranges and generation of cross reference tables (old line/new line comparisons) also make life a whole lot easier. If the program encounters

DEJA VU A LA GNOME

Most *Gnome Kit* commands have direct counterparts or functional equivalents elsewhere. Following is a representative sampling.

KEY

1=BASIC 7.0
2=Mach 5/128
3=Fast Load
4=C-128 Monitor

Command	Alternate Source
CONCAT/APPEND	1
AUTO LINE #	1
DIRECTORY	1,2,3
SAVE	1,2,3
DELETE	1
HEX/DECIMAL/ BINARY CONVERT	2,3
LOAD	1,2,3
LOAD & RUN	2,3
OPEN DRIVE/ PRINTER CHANNEL	2,3
RENUMBER	1
SCRATCH	1
RUN	1
COPY	1
NEW	1
TRAP/TRACE	1
DS/DS$	1
ASSEMBLE/EXECUTE	3,4
DISASSEMBLE	3,4
COMPARE	3,4
HUNT (FIND)*	3,4
TRANSFER (BLOCK TRANSPORT)	3,4

**Gnome Kit's* FIND is more powerful than 7.0's HUNT.

Similar functions are also available in DOS wedges, in BASIC 2.0, and in compiler/assembler programs. BASIC 7.0 is a superset of 2.0, so not all the aforementioned commands are available in the 64 (mode).

a problem trying to renumber code, it returns an error message and unaltered code. After fixing the bug you can renumber.

Disk drive and printer channels are

opened with a few keystrokes. Like the utility cartridges *Mach 5, Mach 128,* and *Fast Load, Gnome Kit* eliminates the need to issue "OPEN x,x,x" commands. As an aside, printed output is in uppercase only.

The Find and Directory commands work like their 64 and 128 counterparts. Save is admittedly quirky. Briwall recommends you save the entire program before trying the partial save, a command which can cause the system to crash. (Adios code.)

The assembler is pretty standard fare. The disassembler can translate hex, ASCII, or decimal input/output by address. Pressing RETURN after the initial action performs the same operation for each subsequent line.

The syntax checking mechanism is nice. After running a program as best as it can, *Gnome Kit* returns an error message and prints the offending line. The cursor is positioned near the actual error for identification and correction. Use the INST/DEL keys to edit the line and continue testing.

Pardon Me, But Your Slip Is Showing

One function of dubious merit (supposedly) widens the space between lines on a monitor. Activating this on an Epson hi-res RGB unit threw the display into convulsions, rendering it unreadable. Pressing RUN STOP halted the flipping; f8 reactivated *Gnome Kit*. Use cautiously, if at all.

Deleting a range of lines can cause *Gnome Kit* to lock up if there is a problem with the program being acted on. Before learning there was such a problem with *128 Example* I issued the command ".D45-" to delete all lines from 45 on up. *GK* went to lunch without the slightest warning. (Subsequent tests on good code showed that the delete command works fine, even if it starts at a nonexistent line.)

Gnome Kit offers a variety of useful programming aids and utilities in one package. Many are available from other sources. Is the one stop approach worth $39.95? That depends on your programming expertise, the amount of time spent cod-

ing, the number of alternate sources you already have, and your budget. Only you can decide.

Briwall, P.O. Box 129, Kutztown, PA 19530 (phone: 215-682-4920).

–Ted Salamone

PROJECT PLANNER/REPORTER
B.E.S.T., Inc.
Commodore 64
Disk; $69.95

Project management, the art of combining labor, material, machines, or services to complete a task, is no longer a pie-in-the-sky proposition thanks to B.E.S.T.'s unique *Project Planner/Reporter.* Anyone who needs to manage construction sites, maintenance chores, coordinate a staff (of designers or programmers for example), or just handle diverse school or business ventures can now do so with unprecedented efficiency and accuracy.

What Is It, Really?

Many computerphiles have had little or no exposure to project management software or its non-electronic counterpart. Consider how easy it is to produce a lengthy term paper, thesis, or business report with a good outline. The upfront work makes details fall into place. *Planner/Reporter* works along the same lines, though it goes beyond the static nature of an outline. Its dynamism translates into up-to-date project information and control. You can adapt the project schedule and manipulate resources (labor, material, etc.) to meet changing conditions.

Getting a Feel

P/R is a menu-driven program with entry prompts, mnemonic commands, and understandable activity and error messages. It makes use of the function keys as well. For those who have had some exposure to project management, B.E.S.T.'s system uses the Precedence Diagramming Method (PDM) as devised by IBM in the mid 1960's. It is alternately referred to as activity-on-node precedence diagramming.

While there is no online help, there is a separate tutorial on the disk. This extremely thorough tutorial, com-

Continued on page 97

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PERMA-LINE
For the C-64
By Buck Childress

Ever type a line number, press the RETURN key, and start to scream—all at the same time? It's a normal reaction when you realize that a vital program line has been hurled into oblivion. Or maybe you've found that Aunt Blabby and Uncle Gabby running into your personal finances program. Soon the whole town will know when the last time you bought a double-scoop ice cream cone was.

Wouldn't it be great if you could have program lines that couldn't accidentally be edited or dumped? And how about run-proof programs that would thwart the snoopy ones, too? Now you can...with *Perma-Line!*

Perma-Line enables you to enter program lines that cannot be deleted in the normal manner. In addition, it lets you endow your programs with the inability to run, even though they'll load and list. *Perma-Line* makes it easy to protect valuable program lines and safeguard your programs from unauthorized use! Here's how to use it.

After saving a copy of *Perma-Line*, run it. The loader will POKE the machine language data into memory and check for errors. The loader then NEWs itself, so be certain you have a copy saved before running it for the first time. To activate *Perma-Line*, type SYS 52000 and press RETURN. You deactivate it the same way. The first SYS turns it on, the second turns it off, etc. You can load, save, and run programs with no interference.

Perma-Line takes advantage of the fact that the highest program line number allowed is 63999. If you try to enter a higher number, you'll get an error message. Consequently, no changes or deletions can be made to lines from 64000 up. If you put your valuable data in this range, it will be protected. With *Perma-Line* active, just enter the high program lines as you would any other lines. You can add, change, and delete lines in this range so long as *Perma-Line* is active. If *Perma-Line* is not active, the program lines are 'frozen' in place. If you (or someone else) should try to do anything to them, an error message will appear, but the lines will remain unscathed. Poor Aunt Blabby and Uncle Gabby. They won't be able to have fun fiddling with your program lines. Just lots of frustration! Now, here's how to keep them from using your program without your consent.

Programs with line numbers from 64000 up still run normally. Data in this area will be read, PRINT commands will print—everything works as it should, with one very interesting, and useful, exception. Any IF-THENs, GOTOs, or GOSUBs that reference a line number from 64000 up (e.g. GOSUB 65000) will bring the program to a screeching halt with a ?SYNTAX ERROR message staring the user in the face. As long as you avoid line references in this area, there's no problem. If prying eyes are of no consequence, this is fine. This would be a great place to put important data and the like. But if you're concerned that Aunt Blabby and Uncle Gabby can't wait to run your program, base your program up here. Put in as many IF-THENs, GOTOs, and GOSUBs referencing this area as you want (e.g. IF X=25 THEN 64000). When they try to run it, and the first line number reference is encountered...zap! ?SYNTAX ERROR! The sooner the reference appears, the sooner the program crashes. Remember, it has to reference a line number from 64000 up. Lower line numbers still work as usual (e.g. GOTO 500). For double protection, put the reference in a line number from 64000 up. As an example, if you enter

```
64000 GOTO 64005
```

the program will crash immediately and since the GOTO is in a line in our 'special' range, it cannot be edited.

Even though no one else can run your program, you can. Load and activate *Perma-Line* before you run your program. Now all those references will work like a Swiss watch. Even though your program can be loaded and listed, no one but you can run it.

Perma-Line allows you to add program lines from 64000 to 65535. This gives you more than 1500 additional program lines to use. All of them have the added benefits of being 'permanent' (except when using *Perma-Line)* and run-protected when you choose.

Experiment with *Perma-Line.* It's easy to use and really allows you to protect your programs. ☐

SEE PROGRAM LISTING ON PAGE 127

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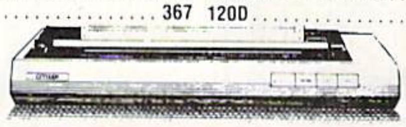
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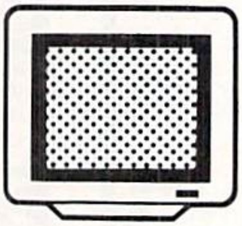
SCREENS



For the C-64



By Marie E. Coon



Have you ever wished you could call up a screen full of information at the press of a key? *Screens* may be your answer. It can be used to make help screens of program instructions and other information, game scores, notes to yourself, and more. It has been structured so that it can be run either by itself or concurrently with a compatible BASIC or machine language program.

When used by itself, *Screens* is loaded and run just as any ordinary BASIC program. Upon running, the bulk of the program is transferred to begin at memory location 45056, which is under the BASIC ROM, and a small 114 byte subroutine is placed to start at location 828. The interrupt is started and the message "PRESS ← FOR SCREENS" is printed in the middle of the screen. Pressing the ← key activates the interrupt. In much less time than it takes to tell about it, the RAM memory from pages 147 through 159 is saved under the BASIC ROM, the *Screens* program is transferred from under the ROM to the just-freed RAM memory, the screen and color information currently on display is saved under the BASIC ROM, and a midscreen window opens to display the *Screens* Start menu. If all of this memory switching seems unnecessary for a program to operate by itself, it is. There are definite advantages when *Screens* is used with other programs, however.

The Start menu offers function key choices to make and/or save a screen, to view a screen previously saved, to view the screen that was saved under the ROM, or to exit the *Screens* program.

The f1 key selects the Make/Save screen option. The Start menu is replaced with the Make/Save menu, which also offers several function key choices. You can change the screen color, border color, and character color with f1, f3, and f5 respectively. F2 will save the screen on display under the filename you designate, while f8 will save the screen under a previously designated filename. Other options are to return to the Start menu, to erase the menu on display, and to recall the Make/Save menu if it has been erased. Erasing the menu provides a clear screen and a cursor which behaves much as it does in direct mode. To change the color of an individual character, use the CTRL and Commodore keys plus a color key just as in direct mode. F5 will change the color of all of the characters on the screen to the next color. The Commodore and SHIFT keys pressed together switch character sets, just as in direct mode. When satisfied with your screen, press f2 to save it as a sequential file. To enable *Screens* to distinguish its files from other sequential files which may be on the disk, the given filename is automatically prefixed with an h followed by a space. The f8 key will save the screen with replace. This is the key to use if you have amended a previously saved screen and wish to save it under the same filename. This save with replace first erases the original screen file and then saves the new screen under the old filename. This avoids the infamous save with replace bug. F6 will return program control to the Start menu. If you have forgotten which function key does what, press f4 and the menu will be recalled.

When f3 is pressed from the Start menu, *Screens* immediately searches the disk for any sequential files having a filename beginning with an h followed by a space. All such files are listed on the screen with the first highlighted in yellow. The CRSR control keys will move the highlight up and down over the listed files. RETURN loads the highlighted file and D deletes the highlighted file. F3 will repeat the listing with the same or another disk and f5 will return program control to the Start menu.

If you load a file, it will be displayed under the View menu. F1 allows the just loaded file to be amended by transferring control to the make/save option described above. F3 repeats the file listing and loading sequence and f5 returns the program to the Start Menu. F7 and f4 control erasing and displaying this menu, respectively. F2 exits the *Screens* program by reversing the RAM/ROM memory switches.

To view, amend, or save the screen that was on display when *Screens* was activated, press f7 from the Start Menu. Viewing, amending, and/or saving is then accomplished the same as for a screen loaded from a disk file.

Since *Screens* operates on an interrupt, it can be run along with many other BASIC and machine language programs. However, since it is an interrupt driven program,

Screens is not compatible with a program that also uses an interrupt. During the operation of the BASIC or other machine language program, all of the *Screens* program except the 114 byte permanent subroutine is safely tucked away under the BASIC ROM. This makes more memory available for the operation of the BASIC program. To increase the number of compatible programs, the permanent 114 bytes can be placed in three different locations. The "A" program location starts at 828 in the tape buffer, the "B" program location starts at 40845, and the "C" program at 53133. The "B" option is the top of RAM memory and if used with a BASIC program must be protected from being overrun with BASIC strings by the following POKEs: POKE 51,141:POKE 52,159:POKE 55,141: POKE 56,159. The "C" option is at the top of the 4K RAM block which begins at 49152. It is above the memory occupied by the C-64 DOS Wedge and will not interfere with it. To implement these options, the *Screens Data A* program must be loaded and run first. Then load and run either the *Screens Data B* or *Screens Data C* program. Running the *Data* program will create the corresponding *Screens* program.

To run a *Screens* program concurrently with another machine language program, first load and run the *Screens* program. Then load and run the other machine language program. If the second program does not also use an interrupt or occupy the same memory as the 114 byte permanent *Screens* subroutine, they should be compatible.

To use a *Screens* program with a BASIC program or a BASIC and machine language program, add the following lines to the beginning of the BASIC program:

```
1 IF A THEN 3
2 A=1:LOAD "SCREENS A",8,1
3 SYS 37742:CLR
```

If "SCREENS A" doesn't work, then try "SCREENS B" or "C". If the program still doesn't work, you may be out of luck.

To designate a different key as the activator key, change the 57 in line 1038 to the keyboard matrix value of the new key and the 95 in line 1354 to the CHR$ code (ASCII code) of the new key. The keyboard matrix value is the value stored in location 197 whenever a key is pressed. This location carries a value of 64 when no key is pressed. The following line entered in direct mode will print out the matrix value of any pressed key:

```
FOR J=.TO10:PRINT PEEK(197): FORT=1TO10
00:NEXT:NEXT
```

Refer to Appendix C of the *Commodore 64 Programmer's Reference Guide* for a complete listing of the CHR$ codes.

Give *Screens* a try. It may just put much needed information only a keystroke away, rather than buried in a stack of magazines. ☐

SEE PROGRAM LISTING ON PAGE 112

Cadet's DOS Revisited

By Cheryl Peterson

In the July '86 *Ahoy!* we presented *Cadet's C-64 DOS* and *Cadet's C-128 DOS* in the column. I invited all of you to make changes and improvements and send them to me. Robert Wempe of Oregon did a bit of research and came up with some notable modifications for the 128 version of the program, which shorten the program considerably.

His letter introduces the changes that he made and which lines they replace. After sharing it with you, I'll try to explain how the modifications work.

Dear Ms. Peterson:

Your comments relative to the 'RENAME' and 'COPY' commands being difficult to use within a program are incorrect—but not your fault! I stumbled upon these undocumented "tricks" by a little experimentation. All of the following work (assume O$ = old filename; N$ = new filename; D$ = disk name; I$ = disk ID):

```
320 COPY""+O$+""TO""+N$+"":RETURN
    (Replaces 320 and 330)

750 HEADER""+D$+","+I$+"":RETURN
    (Replaces 750 and 760)

820 RENAME""+O$+""TO""+N$+"":RETURN
    (Replaces 820 & 830)

430 PRINT"HIT Y TO VALIDATE - ANY OTHER
KEY TO RETURN."
440 GETKEY Q$
450 IF Q$="Y" THEN COLLECT:SCNCLR:RETUR
N:ELSE SCNCLR:RETURN
    (Replaces 430 through 460)

620 IF DS>0 THEN PRINT DS$:RETURN;ELSE
RETURN
    (Replaces 620-640 & 670)
```

Note that only a single set of quotes bracket the comma in the HEADER command.

By the way, the double quote convention also works to read or write a sequence file from within a program. Assume S$ is assigned to a typed-in filename. All of the following work:

```
10 DOPEN #2,""+S$+"" (to read file)

20 DOPEN #2,""+S$+"" (to write file)
```

Surprisingly, a full 16 character filename can be used, because apparently none of the quotes or pluses are counted!

Also, it is not necessary to create a full screen window to get back to normal. The following will erase the window and clear the screen:

```
1010 PRINT"[CLEAR HOME] [HOME] [HOME] [C
LEAR HOME]"
```

In addition, compare the following (ref. your line 250):

BASIC 2.0

```
10 PRINT"DO YOU AGREE? (Y/N)"
20 GET A$; IF A$ = "" THEN 20
30 IF A$ = "Y" THEN 200
40 IF A$ = "N" THEN 300
50 IF A$ <> "Y" OR A$ <> "N" THEN 20
```

BASIC 7.0

```
10 PRINT"DO YOU AGREE? (Y/N)"
20 GETKEY A$
30 IF A$ = "Y" THEN 200
40 IF A$ = "N" THEN 300: ELSE 20
```

Enclosed is a listing of my modifications to your program; note line 100.

Signed,

Robert Wempe

COPY, RENAME, HEADER, COLLECT

In the first section of modifications (lines 320, 430-450, 620, 750, and 820), Mr. Wempe is making use of the C-128's modified and extended disk commands.

Lines 320 and 820 use the modified COPY and RENAME commands. By using these commands, he eliminates the need to open and close the channel to the disk drive.

Lines 430-450 make use of the COLLECT command, again eliminating the need to open and close the channel.

Line 750 does the same thing but uses the HEADER command in place of the old FORMAT command.

CHECKING DISK ERROR STATUS

Line 620 is used in the section where we are checking the disk drive for an error message. His modification eliminates about three lines. It also does not report the error status if there is nothing wrong. The reason this works is that DS (Disk status) is a built-in variable created by the 1571. It represents the numeric value of the disk error reported. If no error occurs, the drive puts a 0 in the variable DS. So the program checks DS to see if it is greater than zero and if so prints the error status. (IF DS>0 THEN PRINT DS$). If it is zero, it returns without printing anything. DS$ is another built-in variable for the character string that explains what DS means.

PERSONAL PREJUDICE

The next change that Mr. Wempe points out has to do with clearing windows and the screen. He corrects my statement that to clear the screen one must create a window that encompasses the full screen. And he's right.

Even knowing this, I would still use my method for clearing the screen. The reason is that the Commodore computers are the only ones that allow you to PRINT a clear or a home. In almost every other version of BASIC you use a command similar to SCNCLR to erase the screen. Most BASICs use either CLEAR or HOME as a keyword.

Admittedly, when dealing with a disk access program on the Commodore there is no chance that anyone would want to translate it for use on another machine. But just as a matter of principle I try not to use Commodore-specific oddities when programming. It's only my opinion, but I think finding weird graphic characters and statement words in the middle of PRINT statements is very disconcerting. So wherever possible I avoid them.

Many times in my column I have said that there is no such thing as correct BASIC programming. Each programmer has little idiosyncracies that set his programs apart from others. This is one of mine.

AN ADMIRABLE INPUT ROUTINE

The two routines that Mr. Wempe presents to us for taking in one key input and analyzing it are fine. I generally use similar routines myself. In fact, I introduced and explained this kind of routine in my May '86 column. GET and GETKEY both take one character from the keyboard. For any input where you only need one key, this is ideal.

The example here does illustrate a good programming practice, though. When doing a comparison test on the value that has come in, it is a good idea to consider all the possible options, preventing the program from bombing out and disappointing the user. If you are expecting only one of two answers, for instance, be sure that any other answers are trapped out so that the program doesn't fall through to the next section.

A word about GETKEY in 7.0 BASIC. Though it functions much like GET in BASIC 2.0, it eliminates the need to repeat the line until a key is pressed, since it waits for valid input. GET on the other hand will indicate that no key was pressed and carry on to the next line of the program, unless you use a comparison test and repeat the line until a key is actually pressed.

I didn't use GETKEY in *Cadet's DOS* because I felt it would just be one more element that C-128 users would have to change if they were going to try typing in both versions. There were four places where it could be used, and I thought most people would be just as happy with an INPUT statement.

ANALYZING LINE 100

Line 100 of Mr. Wempe's version saves a lot of programming space. I don't know how many of you remember my explanation for using ON-GOSUB in the Feb. '86 issue, but line 100 makes good use of this command.

First we must make an adjustment to input though, because the ON-GOSUB routine needs a numeric value. This value is used to determine which subroutine the program jumps to.

For instance, if X=1 the program will branch to the first subroutine specified. If X=2 it will jump to the second routine specified. If X=5 it will branch to the fifth routine specified, and so forth.

But all of our choices are characters rather than numeric values. There are two ways to get around this. Mr. Wempe chose to use the X=ASC(X$) to change the character into its numeric equivalent. ASCII values are offset from zero by 64. If you take a look at an ASCII table you will find that A=65, B=66, C=67, etc. So we need to subtract 64 from the value of X to get the correct value to jump to.

Another way to do the same thing would be to change the main menu and reassign the choices.

```
            CADET'S C-128 DOS

     1        ACCESS DIRECTORY
     2        BACKUP FILES
     3        COLLECT FILES
     4        DELETE FILES
     5        EXIT TO BASIC
     6        FORMAT DISK
     7        GIVE FILE A NEW NAME

ENTER THE NUMBER OF YOUR CHOICE
WHAT IS YOUR REQUEST?
```

For this to work, we would need to modify the variable that holds the user's choice, since it was originally written to hold a string variable. If we didn't change the variable from X$ to X we would get a TYPE MISMATCH error.

SMILING FACES

The Independent Computer User's Group has moved from PlayNET to The Source. Call 1-800-336-3366 and tell them you'd like to sign up. They'll provide you with the current rates, and if you mention ICUG you may even get a special deal. Cherp's Library has been reconstructed in the newly expanded CHAT Area, and will be open Monday and Wednesday nights at 10 p.m. Eastern Standard Time. If you see someone with the handle Cherp, it's probably me. So say hi and I'll introduce you around. If you should have any problems, feel free to ask any ICUG member for help or leave mail to SIG025. (Yup, that's me.)

Beginners to telecommunicating may have a hard time understanding some of the shorthand used by veterans. Consider for example the following "emotion indicators" commonly seen on all the major online services. To understand what the face represents just turn your head to one side. The : is the face's eyes. The rest is the mouth. There are a whole family of these that represent different emotions. Here's a little sample.

:)	smiling or happy
:(	frowning or sad
;)	winking (flirting or sharing a joke)
:'(	crying or very sad
:p	Sticking tongue out
:P	Also sticking tongue out
:D	Laughing
:O	Surprised
):)	Someone wearing a hat
:I	Poker face (used in card games)
:*	Kissing (usually accompanied by the name of the person being kissed)

There are a few abbreviations that confuse newcomers to telecommunications. Some, like C U L8er, are easy enough to figure out. Others are a bit rougher. Here are a few of them.

BRB!	Be right back!
NTTO	Not touching that one
::otf::	On the floor (reaction to something very funny)
BBL	Be Back Later
LOL	Laughing online
OLM	Online message

SEE PROGRAM LISTING ON PAGE 142

S.O.S.

By Tim Little

My family just purchased a C-64 system with a modem and are unsure of the function of the little slide switch on the side of the modem. The manual was very vague. Can you provide any information?

On most Commodore modems the small switch controls the answer/originate mode of the modem. Simply put, most modems can only either call other computers or answer calls from other computers. In order for the modem to know whether to initiate the "conversation," you must tell it whether to call another computer or answer the phone.

The typical setting for your modem should be ORIGINATE or O. This is usually closer to the computer. This is used for systems such as PlayNET and QuantumLink.

The ANSWER is used mainly if you are planning to run a BBS of your own or if you intend to get a call from your friend's computer (his must be set on O).

Having typed in some of your programs, I am skeptical of all this PEEKing and POKEing around. I did not think I could hurt the machine from POKEing from the keyboard; perhaps I am wrong. Two of my friends said they do not own C-64s because of this reason. Can POKEing, as from within a program, hurt my 64?

—G. King
Iowa City, IA

Entering POKEs in the direct mode as well as programs containing POKEs can in no way permanently affect your machine. The very worst that can happen is that your machine will lock up, requiring you to either turn off your computer or use a reset switch in order to use the machine. It is possible, if you have a printer or disk drive attached, to either damage some data or cause the printer to do strange things. Otherwise there is no way a program can hurt your C-64, even random POKEs are harmless.

1) How can I transfer *Penguins* (an ML game from *Ahoy!*, Oct. '86) from the disk I saved it on over to my games disk?

2) When running programs or games, and I want to quit and run something else, I typically have to shut the computer off and power up again to reload the next game. Is this correct?

—J. Fisher
Lindenhurst, NJ

Starting with your first question, I will assume that you have a copy of Flankspeed *and the October '86 issue of* Ahoy! *First, you must LOAD and RUN* Flankspeed, *entering the starting and ending addresses as stated in the beginning of the listing of* Penguins. *Then when you see the C000:__ you load* Penguins *from your old disk using the f3 key. When that is finished loading, you insert your games disk and hit f1 to save a copy onto it.*

I have bad news as to the answer to your second question. Some programs utilize a form of copy protection that renders the RUN STOP/RESTORE combination useless, thus requiring you to either turn off the machine or reset the machine somehow should you want to run another application.

If the RUN STOP/RESTORE combination won't work, you have only two choices, one hardware and the other software. The hardware involves grounding certain pins on the user port or connecting a couple of wires in the serial cable momentarily. Both can be easily built and installed or jury-rigged, but if you don't feel confident enough to tinker with your C-64 you may elect to buy such a switch.

The software method won't work on many sophisticated copy-protected programs but might serve your purpose. Enter the following line before you load your program and it will allow the RUN STOP/RESTORE key to act as a RESET for one shot. After you reset you must enter the line again.

```
POKE792,PEEK(65532):POKE793,PEEK(65533)
```

All the books and magazines I've read about bit-mapped graphics state only that it requires eight kilobytes and not how to actually access this feature of the C-64. I know how to turn off a pixel as it was printed in the November '86 installment of *S.O.S.*

Do I need to program in ML to use it? If not, how do I use the bit-mapped mode?

Unfortunately in BASIC bit-mapped graphics are unbearably slow due to the repetitious procedures and calculations involved. Since many articles have been printed in this magazine on the subject, I cannot again repeat all of the information you may need, but you might wish to check out Commodore Roots *or other features in our other back issues for articles relating to bit-mapped graphics. I will point out the registers needed to use this mode.*

1) POKE 53272,PEEK(53272)OR8 sets the bit map to the 8192 area in RAM.

2) POKE 53265,PEEK(53265)OR32 activates the bit-mapped mode.

3) Use a loop to set the memory from 8192 to 16192 to zeroes.

4) Use another loop to set the background colors. Normal screen area (1024-2023) is where the colors are stored.

5) Now just use the plotting or unplotting as described in any of the articles.

CATACOMBS

For the C-64

By Cleveland M. Blakemore



Being the ardent treasure hunter that you are, you had a hard time resisting the stories about the Catacombs of Darkness and the fantastic caches of gold hidden there by the mysterious builders of the underground fortress.

Armed with only a torch, you descended the steps leading down to the catacombs without hesitating, ignoring the weird cries emanating from the dimly lit crypt, images of bulging chests of ill-gotten lucre swimming in your mind.

Catacombs is a game I created with the intention of experimenting with one of the 64's least appreciated graphic modes – extended background color mode (EBC). Most people refer to it as a useless novelty of the VIC chip, but I have always thought that the ability to change the background color of a whole screen with a single POKE had to have a good game hiding in it somewhere. So far I have created a machine language game and this BASIC program using the VIC's EBC mode, and have yet to run short on ideas for future projects.

Basically EBC mode works like this: your character set is cut down to one quarter of its usual 255 shapes, giving you only 64 to work with, the first 64 in the set. These first 64 characters consist mostly of alphanumeric codes, so if you are planning on writing a game, you will probably have to redefine your character set to substitute one of your shapes for one of the Commodore's 64 default characters.

In EBC the first 64 characters of this set are displayed normally, getting their foreground color from color memory and their background color from the register at 53281. But the codes from 63 to 127, 128 to 191, and 192 to 255 get their background colors from registers 53282, 53283, and 53284 respectively. Although the colors are different, the characters still come from the shape tables of the first 64 codes!

And at first glance we say, "So what?"

But the game possibilities are really staggering, especially pertaining to a slow language like BASIC.

In *Catacombs,* you wander around in a huge underground labyrinth that is bigger than the screen itself. The

map of the dungeon is 50 rows by 80 columns, with 10 levels. The screen scrolls in all four directions around you whenever you move against the border. This scroll is accomplished by a short ML routine that sits in an unused portion of memory.

Your purpose on each level is to avoid the traps and monsters, get as many gold chests as possible, and find the key that unlocks the door leading to the next level.

On the first five levels, this is relatively easy, since the catacombs are illuminated. But on the next five levels the lights are out, and the only things you can see are the objects which are within range of your torch. It takes an extensive search, as well as caution, to avoid the traps and monsters while you look.

There are five types of critters living in the catacombs: skulls, wizards, bats, spirits, and snakes. There are three of these guardians on each level, and they are quite intelligent and relentless in their efforts to catch you. If one of the monsters catches you the game ends.

The chests are worth 50 gold points each. A key adds a 100 gold point bonus to your booty. Each level is worth 25 gold points.

There are two types of doors in the dungeons. One is white, the door you came in, and one is gray, the one you need to unlock. You cannot go back through the white door. You cannot go through the gray door until you have the key.

The traps in the dungeon are detectable if you keep your eyes open. The tripwires look like single pixels on your screen. If you set off a trap, you lose 50 gold points —but worse than that, the lights go out in the level you are on. You can get through the first five levels a lot easier by avoiding the traps, but levels 5-10 are dark anyway, so you only lose 50 gold points.

If you complete all 10 levels, the game ends, prints your total of gold points, and asks you if you wish to play again. Press "Y" or "N" at the prompt.

While you are playing *Catacombs*, watch how interesting EBC mode is. The walls of the catacombs are always visible in one color. The border of stones that surrounds the dungeon is always dark gray, and so is the door to the next level. The door you enter through is white.

The most exciting feature is that traps, monsters, and treasure are always black, so they are invisible when the dungeon is dark, and the only way you can see them is to illuminate them with your torch, which is an expanded sprite which has its priority behind the background.

The EBC mode is highly effective in this program because of the ML scrolling routine. If this program was not in EBC, I would have to scroll both the video screen and color memory to have a color display—but this way I only have to scroll the video screen, since the characters get their color from registers 53281-53284 instead of color memory.

Enjoy *Catacombs*. I hope to have another interesting game in machine language for you soon, also using the Commodore 64's extended background color mode. ☐

SEE PROGRAM LISTING ON PAGE 121

Reader Service No. 132

TIPS AHOY!

Compiled by Michael R. Davila

As is evidenced by its jump to five full pages this month, *Tips Ahoy!* has become one of our most popular features. We'd like to remain the Commodore community's number one forum for short, helpful programming routines. To that end, we invite you to forward your best efforts to:

Tips Ahoy!
c/o *Ahoy!* Magazine
Ion International Inc.
45 West 34th Street—Suite 407
New York, NY 10001

Payment is made upon acceptance at highly competitive rates.

AUTO-RUN 64

Many times someone using your program might cause it to crash due to an Overflow Error, or some error that the user causes. With the following program, if an error occurs, the program will Re-run itself. This sort of program works nicely with BBS's, as they are most vulnerable to crashers. It will work nicely with many other programs too. SYS 49152 activates it; SYS 49201 disables it.

—Barry Allyn
Arlington, WA

```
·10 FORT=49152TO49213:READA:POKET,A:C=C+A
 :NEXT:IFC<>6535THEN PRINT"DATA ERROR!"
·20 DATA 120,169,13,141,20,3,169,192,141,
 21,3,88,96,165,157,201,128,240,3,76,49
·30 DATA 234,169,5,133,198,169,82,141,119
 ,2,169,85,141,120,2,169,78,141,121,2,169
·40 DATA 13,141,122,2,76,49,234,120,169,4
 9,141,20,3,169,234,141,21,3,88,96
```

64 SOFTWARE RESET

Don't have a RESET switch installed on your 64 yet? Well, type this program in, type SYS 49152, and presto, you have one. To reset the system, hit SHIFT-CONTROL. It's never been this easy, folks.

—Barry Allyn
Arlington, WA

```
·10 FORT=49152TO49177:READA:POKET,A:C=C+A
 :NEXTT:IFC<>2854THENPRINT"DATA ERROR!"
·20 DATA 120,169,13,141,20,3,169,192,141,
 21,3,88,96,173,141,2,201,5,240,3,76,49
·30 DATA 234,76,226,252
```

SLOW PRINTING AT ML SPEED

There are many occasions when it would be desirable to control the speed of printed text. How many times have you listed a program and it just zoomed on by? Or, what about the last time the direction for a program zipped past? And then there is the time when...and the printing just would not slow down! With *Slow ML Print,* you have the choice of 256 printing speeds. The utility works with the C-128, C-64, and VIC 20 (it will probably work with other Commodore computers as well).

Make sure the utility is stored in a safe area of RAM in your computer by changing the value of S, if necessary. Once the utility is activated, everything that is printed will range from standard to extremely slow by POKEing (from direct or program mode) a value from 0 (fastest) to 255 (slowest) into location 252. *Slow ML Print* can be quickly disabled with RUN STOP and RESTORE. A SYS to the starting address will reactivate it.

—Shawn K. Smith
Bronx, NY

```
·100 REM* SLOW (ML) PRINT -SHAWN K. SMITH
·110 S=5120:REM START ADDRESS OF ROUTINE!
·120 FORD=STOS+34:READY:POKED,Y:NEXT
·130 DATA 169,000,162,255,141,038,003,142
·140 DATA 039,003,096,072,138,072,152,072
·150 DATA 174,252,000,240,008,160,000,136
·160 DATA 208,253,202,208,250,104,168,104
·170 DATA 170,104,076:P=S+11:H=INT(P/256)
·180 POKES+3,H:POKES+1,P-256*H
·190 POKED,PEEK(806):POKED+1,PEEK(807)
·200 PRINT:PRINT:PRINT"SYS"S"ENABLES
·210 PRINT"RUN STOP-RESTORE DISABLES
·220 PRINT"POKE252,SPEED (0-255)
·230 REM SYS(S)
```

MENU HILITER

My favorite tip for producing an easy to use menu having lots of colorful pizzazz is to first fill a string array with each array element being equal to a menu item. Then, POKE location 53283 with the highlight color you want and turn on extended background color mode. With extended color on, any screen lettering done in reverse mode appears on the screen with the character color unchanged and the background color of each character in the highlight color. I use f5 and f7 respectively to move the color bar up and down, with SPACE to make a choice. To use different control keys, change the PEEK (197) values in Lines 1030 through 1050. To use a joystick with the fire button making the choice, replace Lines 1030 through 1050 with:

```
·1030 JV=PEEK(56320) AND 31: IF JV=29 THE
 N 1080:REM HILITE DOWN
·1040 IF JV=15 THEN POKE BL,PEEK(BL) AND
 191:RETURN:REM TURN OFF EXTENDED BACKGRO
 UND MODE: # OF CHOICE IN VARIABLE N
```

```
•1050 IF JV <> 30 THEN 1030: REM HILITE U
 P
```

To adapt the subroutine to a multiple menu program, simply establish more variables to control those features you wish to vary from menu to menu, such as the screen printing locations, the spacing between menu options, the number of menu items, and the regular and highlight character colors. The menu string array should be dimensioned to accommodate the menu having the most selections.

An added touch would be to replace the short delays in Lines 1020 and 1100 with a pip sound. This would require a new line 1002 to clear the sound registers and turn up the volume:

```
•1002 SO=54272:FOR J=0 TO 27:POKE SO+J,0:
 NEXT:POKE 54296,15
```

Then replace the delays with

```
POKE SO+6,240:POKE SO+4,17:POKESO+H,90:
FOR T=1 TO 3:NEXT:POKE SO+4,16
```

—Marie E. Coon
Bothell, WA

```
•10       REM *** MENU HILITER ***
•15 M$(1)="SET MENU SELECTIONS":M$(2)="EQ
 UAL TO ELEMENTS OF
•20 M$(3)="[RIGHT][RIGHT]MENU (M$) ARRAY.
 ":M$(4)="[3"[RIGHT]"]MENU CHOICE IS
•25 M$(5)="[RIGHT]HELD IN VARIABLE N
•30 PRINT"[CLEAR]"TAB(134)"[c 5]MENU HILI
 TER[c 4]"
•55 Y=5:GOSUB1000:STOP:REM ON N GOTO HERE
•1000 FORJ=1TOY:PRINTTAB(50)M$(J):NEXT:RE
 M PRINT MENU
•1005 R=53280:BL=53265:X=4:N=1:POKER,1:PO
 KER+1,15
•1010 POKER+3,7:POKEBL,PEEK(BL)OR64:REM T
 URN ON EXTENDED COLOR (YELLOW)
•1015 POKE214,X:PRINT:PRINTTAB(10)"[RVSON
 ][RED]"M$(N):REM HIGHLIGHT TOP CHOICE
•1020 FORT=.TO50:NEXT:REM SHORT DELAY
•1030 IFPEEK(197)=3THEN1080:REM F7 DOWN
•1040 IFPEEK(197)=60THENPOKEBL,PEEK(BL)AN
 D191:RETURN:REM TURN OFF EXT BACKGROUND
•1050 IFPEEK(197)<>6THEN1030:REM F5 UP
•1060 IFN=1THEN1030:REM TOP CHOICE
•1070 POKE214,X:PRINT:PRINTTAB(10)"[RVSOF
 F][c 4]"M$(N):N=N-1:X=X-2:GOTO1010
•1080 IFN=YTHEN1030
•1090 POKE214,X:PRINT:PRINTTAB(10)"[RVSOF
 F][c 4]"M$(N):N=N+1:X=X+2:POKE14,X:PRINT
•1100 PRINTTAB(10)"[RVSON][RED]"M$(N):FOR
 T=.TO50:NEXT:GOTO1030
```

CUSTOM BIT MAPS FOR THE C-128

I have invented a routine that enables you to create a custom-made background on the bit map of the Commodore 128 by using a technique I call sprite stamping. The program allows you to take any readily made sprite from memory and transfers it to the bit map. Once the bit map has been filled up, you can add such things as text, etc. The space left between each sprite is chosen by the user. You may overlap and reverse the sprites by selecting the number of the GSHAPE VALUE when it is asked. To do all this, enter the folowing program:

```
•5 GRAPHIC 0,1
•10 INPUT" SPRITE NUMBER TO USE ";N
•15 INPUT" CLEAR BIT MAP[4" "]Y [3"[LEFT]
 "]";Y$
•20 IF Y$="Y" THEN C=1
•25 IF C=1 THEN INPUT" BACKGROUND COLOR #
 ";K: COLOR0,K
•30 INPUT" BORDER COLOR # ";B: COLOR4,B
•35 INPUT" PIXEL COLOR # ";P: COLOR1,P
•40 INPUT" X INCREMENT # ";X2
•45 INPUT" Y INCREMENT # ";Y2
•50 INPUT" GSHAPE VALUE # ";V
•55 INPUT" OK[4" "]Y [3"[LEFT]"]";O$
•60 IF O$ <> "Y" THEN RUN
•65 GRAPHIC 1,0
•70 SPRSAV N,A$
•75 A$=A$+CHR$(23)+CHR$(0)+CHR$(20)+CHR$(
 0)
•80 FOR Y=1 TO (200-Y2) STEP Y2
•85 FOR X=1 TO (320-X2) STEP X2
•90 GSHAPE A$,X,Y,V
•95 NEXT:NEXT
•100 GETKEY B$:GRAPHIC 0,1:END
```

If you do not currently have a sprite in memory, either quickly design one, preferably one that has a 3-D effect to it, or load a binary sprite file of yours into memory. When choosing the X and Y increments, remember a sprite is 24 x 21 pixels. So if you want to display a sprite that takes up its whole space, you may want to set the increments higher than the sprite boundaries, such as X=25, and Y=22.

If you are not sure about the GSHAPE VALUES, a small reference list is given below:

#	Outcome
0	Place SPRITE as is
1	REVERSE SPRITE
2	OR SPRITE (COMBINE IT) WITH THE AREA
3	AND SPRITE (OVERWRITE IT) OVER THE AREA
4	EOR EXCLUSIVE OR SPRITE IT WITH THE AREA

If you *are* satisfied with the outcome of the hi-res screen, you may save it by using the following statement.

Make sure you have a disk in the drive that has at least 50 blocks on it so no errors will occur.

```
BSAVE"name of hi-res screen",B0,P7168,P1
6192
```

To load the file, you may type the following command in either direct mode or from your BASIC program:

```
BLOAD"name of hi-res screen"
```

Notice the parameters are no longer needed since they have been saved to disk. Happy bitmapping!

–Robert J. Tiess
Middletown, NY

TWO ITALIC CHARACTER SETS

Tired of the same old Commodore 64 character set? Designing one's own set would be extremely time consuming and a waste of programming memory. This amazing relocatable machine language routine will end this problem. It will have the ability to design not one, but two new italic character sets, in both upper and lower cases. This is made possible by manipulating existing character definitions already in the C-64's ROM. Very simply, what the code does is shift the upper four bytes of each character definition to either the left or the right, creating two new fonts in the process. By changing one value, marked in the listing, and reexecuting the code, you can create left shifted italics (42), right shifted italics (106), or go back to the original set (234). However, if the ML code is already POKEd in memory, one can change fonts by the commands:

```
POKE ADD+63,either 42,106,234:SYS ADD
```

where the start of the ML routine, 'ADD', is defined in the BASIC program. The new character set will be located at 12288 - 16383 ($3000 - $3FFF), so a BASIC program will be limited to 10K. If you feel this is not enough room for your application, you may want to move the start of BASIC above the new character set with the commands:

```
POKE16384,0:POKE44,64:POKE52,160:POKE56,
160:NEW
```

giving you now about 24K. Be sure to save the original program before this last instruction is executed.

–Andrew Vajoczki
Brantford, ONT

```
·100 IFPEEK(44)=8THENPOKE52,48:POKE56,48:
CLR
·110 ADD=828:REM  RELOCATE ANYWHERE
·120 FORX=0TO116:READA:POKEADD+X,A:NEXT
·130 SYS ADD
·200 DATA169,208,133,140,169,48,133,142
·210 DATA173,14,220,41,254,141,14,220
·220 DATA165,1,41,251,133,1,169,0
·230 DATA133,251,133,252,170,168,133,141
·240 DATA133,139,232,224,9,208,2,162
·250 DATA1,138,201,5,176,23,165,252
·260 DATA201,4,144,9,201,8,144,4
·270 DATA201,12,144,1,56,177,139
·271 :
·275 DATA106:REM 42,106 ITALICS, 234 OFF
·276 :
·280 DATA145,141,24,144,4,177,139,145
·290 DATA141,200,208,4,230,140,230,142
·300 DATA230,251,208,2,230,252,165,252
·310 DATA201,16,208,198,165,1,9,4
·320 DATA133,1,173,14,220,9,1,141
·330 DATA14,220,173,24,208,41,240,9
·340 DATA12,141,24,208,96
```

SYSPLOT AND SYSCLEAR

Perusing a disassembly of Commodore BASIC 2.0 ROM, I discovered that the C-64 has routines used *by* BASIC not available *in* BASIC that would be very useful in BASIC programs. The following are two machine language subroutines that make the BASIC ROM subroutines to plot the cursor and clear lines of the screen a snap to use in your BASIC programs. Both are very short and fully relocatable; they can be placed in any available memory location without modification. The parameters used when the routine is called can be complex statements, such as SYSPLOT,(X*Y+(FNA(B)),(Y AND (A/2))), and will be evaluated before the routine is called. Please note that these listings contain elements included for clarity and demonstration that are not essential to the operation of the routines. To incorporate them into your own programs, you may combine lines 100, 110, and 120 into one line and, provided you type the DATA statements carefully, eliminate 140 and 150 (and 160 in SYSPLOT). Please note also that while these routines check for and abort on syntax errors, there is no range checking: Attempting to plot the cursor to a nonexistent screen location or clearing lines less than 0 or greater than 26 can cause catastrophic (but interesting) results.

–Paul Sobolik
Pittsburgh, PA

SYSPLOT

```
·10 REM SYSPLOT
·20 REM SYNTAX: SYS PLOT,XPOS,YPOS
·30 PLOT=828
·40 FORX=0TO15
·50 READ BYTE:POKE PLOT+X,BYTE
·60 CK=CK+BYTE:NEXT
·70 IF CK<>2443 THEN PRINT"ERROR IN DATA
STATEMENTS":END
·80 PRINT"[CLEAR]":SYSPLOT,10,9:PRINT"TYP
E SYSPLOT,XPOS,YPOS"
·90 SYSPLOT,12,13:PRINT"TO PLOT CURSOR":S
```

```
YSPLOT,0,0:END
•100 DATA 32,155,183,134,251,32,155,183
•110 DATA 138,168,166,251,24,76,240,255
```

SYSCLEAR

```
•10 REM SYSCLEAR
•20 REM SYNTAX: SYS CLEAR,ROW1,ROW2
•30 CLEAR=828
•40 FORX=0TO28
•50 READ BYTE:POKE CLEAR+X,BYTE
•60 CK=CK+BYTE:NEXT
•70 IF CK<>5020 THEN PRINT"ERROR IN DATA
 STATEMENTS":END
•80 SYSCLEAR,8,12:PRINT"[CLEAR]TYPE SYSCL
 EAR,ROW1,ROW2 TO CLEAR BETWEEN ROWS":END
•90 DATA 32,155,183,134,251,32,155,183
•100 DATA 232,134,252,166,251,32,255
•110 DATA 233,232,228,252,208,248,166
•120 DATA 251,160,0,24,76,240,255
```

SAFE INPUT BASIC ROUTINE

Everybody has seen, I'm sure, those "short little routines" printed in magazines that provide foolproof BASIC input. Usually they are two pages in length and can sometimes be longer than the program itself, and are often in machine language.

The routine below is the one I always use in BASIC for any input that I cannot afford to have tampered with. It is short enough that I can merely list it on the screen, type NEW, and then load my program. Then I can cursor back up to the lines, and enter them into the program in direct mode just by hitting RETURN on each line.

It only accepts alphanumeric input, with no cursor control. You can include commas in your string, and set the number of characters desired in the line in the variable "A", then GOSUB to it from anywhere in your program. IN$ is the input string it returns. The best part about it is that it flashes the cursor, just like regular input, to let the user know the computer is waiting. It will clear the line it starts on before it prints the prompt. By changing the size of this string that clears the line it starts on, and limiting the number of characters in A, you could set up input windows in BASIC very easily. Since it is entirely in BASIC, it can be easily modified to your program requirements, unlike machine language. I have found the routine very useful, and have included it in just about all my programs for the C-64 that require an input.

—Cleveland M. Blakemore
Richmond, VA

```
•6000 REM TAMPERPROOF INPUT
•6010 REM CHARACTER MAXIMUM IN "A"
•6015 A=20
•6020 PRINT"[41" "][UP]";
•6030 IN$="":POKE198,0:POKE204,0
•6040 WAIT198,15:GETZ$:Z=ASC(Z$):IFZ>95TH
 EN6040
•6050 ZL=LEN(IN$):IFZL>ATHEN6070
•6060 IFZ>31THENIN$=IN$+Z$:PRINTZ$;:GOTO6
 040
•6070 IFZ=13ANDZLTHENPOKE204,1:PRINT" ":R
 ETURN
•6080 IFZ=20ANDZLTHENIN$=LEFT$(IN$,ZL-1):
 PRINT" [LEFT][LEFT] [LEFT]";
•6090 GOTO6040
```

REM TAMER!

There was a time when the REM command was very peaceful. When one found a program containing REMs, he was usually rewarded with some insight into the working of the program by its creator. Now, however, REMs are not just used for providing information about a program. In fact, more and more, REMs are being used to deceive, deprive, and frustrate. Many individuals have found that by placing SHIFTed and special characters after the REM, almost anything could be accomplished, including having a program display a Syntax error when listed. Not long ago, when my older sister started altering the REMs in my programs with SHIFTed L's and ESC characters, I knew it was time to tame those REMs!

REM Tamer! will search a program looking for REMs and replacing any SHIFTed or special characters after the REM with a !. The utility is fully relocatable by changing the value of S. In its present form, the utility is written for the 128. However, if the numbers 45 and 46 in line 140 are changed to 43 and 44, respectively, the utility will work with the VIC and 64.

Load and Run *REM Tamer!*, then load the program to be tamed and SYS to the starting address of the utility. Within seconds, the program will be tamed!

—Shawn K. Smith
Bronx, NY

```
•100 REM* REM TAMER! ----- SHAWN K. SMITH
•110 S=5555:REM RELOCATABLE WITH 'S'
•120 FORD=STOS+55:READY:POKED,Y:NEXT
•130 PRINT"TO TAME REMARKS: SYS"S:END
•140 DATA 165,045,072,165,046,072,160,000
•150 DATA 104,133,252,104,133,251,177,251
•160 DATA 072,200,177,251,208,002,104,096
•170 DATA 072,200,200,200,177,251,240,230
•180 DATA 201,143,208,247,200,177,251,240
•190 DATA 221,201,032,144,004,201,096,144
•200 DATA 243,169,033,145,251,208,237,234
```

USR JOYSTICK

There are many great programs available for the C-64 which utilize joysticks—especially games! Nevertheless, if the joystick routine was written in BASIC, chances are the entire program lacks speed because of the formula which must be employed to read the joystick correctly. If you own one of these programs or are writing a program of your own that will employ joysticks, *USR Joystick* may be the speed you are looking for.

USR Joystick is written in machine language, which

is at least 100% faster than BASIC. And since the utility uses the USR vector, there is no need to memorize a SYS number to retrieve the current value of the joystick. The following statement returns a value depending on the direction of the joystick:

```
J=USR(X)
```

X should equal 1 for port 1, or two for port 2. The value that J returns is based on which direction the joystick is facing and if the fire button is pressed:

8	1	2
7	0	3
6	5	4

For instance, if the joystick is facing north (forward), the value of J will be 1. 128 is added to the value of J if the fire button is pressed. Using the example above, J will equal 129 if the button is pressed.

C-128 owners may have noticed that the value returned for J by *USR Joystick* is the same as that returned by the C-128's JOY command. —Shawn K. Smith
Bronx, NY

```
100 REM* USR JOYSTICK --- SHAWN K. SMITH
110 S=49152:REM RELOCATABLE WITH 'S'
120 FORD=STOS+58:READY:POKED,Y:NEXT
130 DEFFNH(S)=INT(S/256):POKE786,FNH(S)
140 DEFFNL(S)=S-256*FNH(S)
150 POKE785,FNL(S):T=S+32:S=S+43
160 POKET,FNL(S):POKET+1,FNH(S)
170 DATA 032,247,183,170,240,003,076,072
180 DATA 178,136,192,003,176,248,152,234
190 DATA 073,001,168,169,255,141,000,220
200 DATA 185,000,220,170,041,015,168,185
210 DATA 043,192,168,138,041,016,208,004
220 DATA 152,009,128,168,076,162,179,234
230 DATA 004,002,003,000,006,008,007,000
240 DATA 005,001,000
250 PRINT"USR JOYSTICK IS ACTIVATED":END
```

SPLIT SCREEN

This program generates a split screen in C-64 mode. You will have four rows of text at the bottom and the rest will be in high-resolution mode.

To activate it type RUN, and the split screen will be activated.

The starting location for plotting pixels (picture elements) is 8192. —Ernest Croot
Bevinsville, KY

```
10 X=49152
20 READ A:IFA=-1THEN40
30 POKEX,A:X=X+1:GOTO20
40 SYS 49152:END
50 DATA 120,169,28,141,20,3,169,192,141,
 21,3,169,1,141,26,208,169,27
60 DATA 141,17,208,169,127,141,13,220,88
 ,96,169,1,141,25,28,173,18,208
70 DATA 201,218,16,0,176,21,169,218,141,
 18,208,169,28,141,24,208,173
80 DATA 17,208,9,32,141,17,208,76,81,192
 ,169,0,141,18,208,169,21,141
90 DATA 24,208,169,223,45,17,208,141,17,
 208,173,13,220,41,1,240,3,76,49
100 DATA 234,76,188,254,-1
```

SPRITE DATA MAKER

The sprite designer built into the 128 is very easy to use, but lacks certain features that are helpful. This program can be appended to the program you're working on and will make data statements for the sprite you choose. To use type RUN 60000, then RETURN, and the program will ask for the starting line, line increment, and sprite number. The data statements will automatically be entered into the program. —Joseph Bedard
Hyde Park, MA

```
60000 PRINT"[CLEAR] [3"*"] SPRITE DATA M
AKER [3"*"]"
60001 PRINT"[DOWN](STARTING LINE),(LINE
INCREMENT),SPRITE # (1-8)":INPUT SL,IN,S
N:L=0:SN=(SN+55)*64:PRINT"[CLEAR][DOWN][
DOWN]";
60002 FORX=0TO63STEP8:PRINTSL+L"DATA ";
60003 FORY=0TO7:P=PEEK(SN+X+Y):P$=STR$(P
):N=LEN(P$):N$=RIGHT$(P$,N-1):PRINTN$;:I
FY<7THENPRINT",";:ELSEPRINT
60004 NEXTY:L=L+IN:NEXTX
60005 PRINT"[HOME]";:FORT=0TO7:POKE842+T
,13:NEXT:POKE208,8:END
```

KOALA DRAW 128

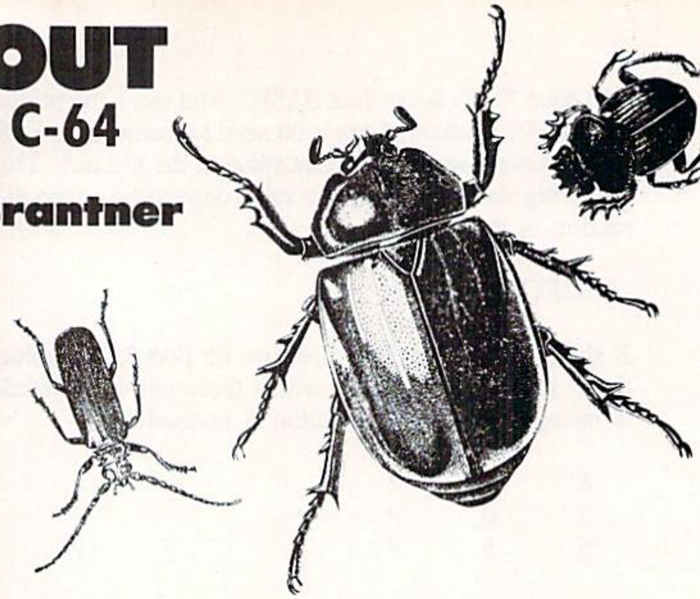
This program is for the 128 and the Koala pad. The graphic screen is in multicolor, but you can't draw in true multicolor. The function keys are defined as follows: f1—change background; f3—change cursor color; f5—clear screen; f7—exit program. —Joseph Bedard
Hyde Park, MA

```
10 REM KOALA DRAW 128
20 GRAPHIC3,1:SCALE1,480,240:C=2:B=1
30 FORT=1TO8:KEYT,CHR$(T+132):NEXT
40 COLOR0,B:COLOR4,C:COLOR1,C
50 X=(POT(1)-16):Y=(POT(2)-16)
60 IF X>-1ANDY>-1THENDRAW1,X,Y
70 GETA$
80 IF A$=CHR$(133)THENB=B+1
90 IF A$=CHR$(135)THENC=C+1
100 IF A$=CHR$(137)THENGRAPHIC3,1
110 IF A$=CHR$(139)THENCOLOR0,12:COLOR4,
 14:GRAPHIC0,1:PRINT"[HOME][LEFT]";:END
120 IFC>16THENC=1
130 IFB>16THENB=1
140 GOTO40
```



BUGOUT
For the C-64

By Tony Brantner



B*ugout* is a fast-paced arcade style game in which you guide our hero, Smilin' Stan the exterminator, against an endless swarm of giant insects.

After typing in and saving a copy of *Bugout* using *Ahoy!'s Flankspeed* program (see page 111), SYS 49152 to start. The object of the game is to destroy as many bugs as you can before too many get behind you.

The game begins with Stan's entrance from the left side of the screen, armed with a can of the strongest insecticide known to man. Use a joystick plugged into Port 2 to move Stan up and down the screen, and press the fire button to spray a stream of repellent at any bug that gets within range.

All the bugs run away from you at different speeds. Bumping into an insect from behind causes it to run faster for a few moments. Since you can't move vertically when using the spray can, you can use this technique to keep the bugs out in front of you. This applies to all the insects except bees. Since the bees aren't as easily intimidated, they tend to fly toward you instead of away. And any contact with a bee results in a sting which paralyzes you for a few moments, giving the other bugs a chance to slip by.

At the bottom of the screen you will find the score, the number of bugs missed, and the high score for the current session. Scoring begins at 10 points for each bug, but increases as the game speeds up. You can use the SHIFT-LOCK key to freeze the action. The game ends once three bugs are missed. □

SEE PROGRAM LISTING ON PAGE 142

Continued from page 75
bined with the foolproof nature of the product itself and its lucid, fact-filled manual, makes the use of help screens unneccessary.

Besides *Planner*, the disk also includes two other programs–*Reporter* and *Disk*. The former makes it possible to manipulate the project schedule, meeting actual environmental conditions in the process. The disk routine accesses DOS so you can format disks, delete files, or rename them. It is easier to use than Commodore DOS because there are prompts every step of the way.

The owner's manual should be sent to 90% of the software houses in the country. They could use it as a model for their documentation. It not only explains project management techniques and philosophies, but also runs through every step in such a fundamental manner that you'd have to read it with your eyes closed not to understand.

Every screen displays active function keys and mnemonic commands (f6 starts a new project, "C" calculates the critical path). Such attention to detail obviates the need for a pull-out reference card or keyboard template. It also saves a lot of time because users don't have to continually search the manual for clues on what to do next.

The Specs

Project Planner/Reporter handles projects with up to 99 activities of up to 999 duration days per activity. (A task can last almost three years!) Except for start events (the beginning), any event can have from one to five predecessors (preceding events). You can choose between five or seven day work weeks for any project.

The system calculates the critical path (tasks whose delay will delay the entire project) based on activity entries and checks for improper logic (loops, more than one start or ending). The project schedule displays or prints out; a Gantt Chart can be printed but not be displayed. (See the **What It All Means** sidebar for terms definitions.)

The *Reporter* accepts time-phased information concerning activity progress. It updates the schedule, allowing new critical path calculations. You simply enter projected or actual finish dates for remaining activities and the routine calculates remaining activity float time and remaining total project float time.

WHAT IT ALL MEANS

What follows is a brief introduction into the world of project management terminology. Every discipline has its own language; do you remember how foreign computerese sounded at first?

Activity–a single task.

Critical–an activity whose delay will cause the project to be delayed.

Early/Late Start–the earliest/latest time a task can start.

Early/Late Finish–the earliest/latest time a task can finish.

Free Float–the amount of time a task can be delayed without delaying another.

Gantt Chart–a graphic portrayal of project tasks displaying early and late start dates, early and late finish dates, and free and total float.

Network–the logical sequence of events that comprises a project.

Predecessor–a directly linked prior activity. If Task A is the project starting point and Task B follows directly, then A is B's predecessor.

Successor–a directly linked following activity. In above example, B is A's successor.

Total Float–the amount of time an activity can be delayed without delaying an entire project.

Planning a Project

About 80% of the data entry is intuitive or prompted. Users familiar with project management concepts probably won't need the manual after the first session. Inexperienced planners who review the demo can be effective in 30 minutes.

The first step is to diagram (flow chart) the project tasks and relationships on paper. Even simple networks should not be entered directly into the program: experience demonstrates that it is easier to establish and maintain the proper flow on paper. Users with an outliner like *Brainstorm 128* might prefer creating the relationships with it. Regardless of the actual means, you should not attempt direct entry of any project networks; the confusion and frustration will be overwhelming.

After making desired entries, press "C" to calculate the critical path. The program checks for input errors such as no start or ending points, multiple start or ending points, and loop errors. Loops occur when a group of tasks are locked into a circular reference, repeating forever. (My first attempt produced a multiple end error even though I double checked the hard copy diagram. Correcting the problem was easy because the program alerted me to the specific problem.)

Once the errors have been edited out, you attempt another critical path calculation. If all is well, *Planner* produces a schedule complete with early and late start data, early and late

finish information, and total and free float timeframes.

The schedule screen also indicates selected work week (5 or 7 days), project duration, current data, individual activity number, activity description, and the person responsible for completing the task.

Progress is keyed into the *Reporter* to update timeframes. Simply enter actual or projected start/completion dates and recalculate. Since the screen layouts and procedures are nearly identical to those in the *Planner* portion of the package, there is no need to learn anything new.

Just like *Planner, Reporter* uses a function key to save data to disk. Reports (schedules) are also printed in the same manner, though *Reporter's* output contains additional information about actual project status (completed tasks, behind, ahead, scheduled, etc.). Two options are available, *Early Finish* or *Late Finish*. By printing both you can quickly compare the ramifications of delayed tasks.

The Bottom Line

Nothing in this world is perfect, and even *Planner/Reporter* could stand a little improvement. For one thing, the activity description field should be longer. The space provided is adequate only if you are very good with abbreviations or coded messages. The other problem concerns the non-integration of the disk's four programs. While having to load the tutorial and *Reporter* separately is acceptable, rebooting to access the disk commands is ludicrous. These functions should be available from within *Planner* and *Reporter*.

Despite these two shortcomings, *Project Planner/Reporter* is a must-have tool for anyone who controls or oversees multiple resources. Programs as complete, refined, and well-behaved as this one are rare. Add its remarkable cost effectiveness into the equation and you have true value, the like of which few programs can equal. It is one of the best C-64 productivity titles in a long time.

B.E.S.T., Inc., P.O. Box 852, McMinnville, OR 97128 (phone: 503-472-9512). *—Ted Salamone*

LIXTER

For the C-64

By Tim Little

I'm sure all the advanced users out there have wanted a utility that prints out SEQ files, like word processor or terminal buffers, to the screen or printer. Or checks a file that hasn't been accessed in a while to determine whether it was the ML game you were working on or just the sprite data.

If you've ever tried to print an autostart program you were faced with a problem right at the start: once it loaded, it was already running. Or maybe the latest version of your program is now loading with a disk error near the end (if you're lucky) of the load; as you know, listing it will mess it up as soon as it's done. Trying to delete the erroneous lines will be to no avail, as such errors tend to screw up vital pointers.

Alas, there is a solution: Print the program without loading it. Some programming necromancy is in order here. I reasoned that if the computer can read and understand my program, I can too. So by using memory maps, DOS manuals, and every utility book I had on hand, I wrote *Lixter.*

Lixter will allow you to print a disassembly, BASIC LIST, hex dump, or simple PETSCII dump (with control characters translated), all without loading the program into memory. It works by getting one byte at a time from the disk file and interpreting it, proceeding until the end of the file is reached at which time it gracefully bows out.

HOW TO USE

After running the program, just enter the program name (no quotes or ,8,1 needed) or $ for the directory. Should you want to quit, type the period at this point. If you wish to access the same file again, hit RETURN (actually this was a bug in the BASIC interpreter, but now serves as a nice feature). If you didn't choose the QUIT, LAST FILE, or DIRECTORY options, you will be prompted for the file type, i.e. SEQ or PRG. At this point you must enter either S or P; if you wish to print an REL or DEL just change the program.

Now the fun part begins. The starting address was printed to the device you just selected. The printer will print twice the number of hex entries per line as does the screen; this should present cosmetic problems on 40-column printers. You will now be asked for the format for the display. An ASCII dump is actually a PETSCII dump with control characters printed out as their English representations. Undocumented codes are printed as periods, as are Commodore key combinations. Hex dumps are useful for determining the type of file you are dealing with.

Disassemblies may be printed out with different starting addresses than the one originally specified. But you must enter the new starting address in decimal. All branches will be corrected if this option is chosen. I have left the DATA statements structured so that the undocumented opcodes may be inserted instead of the ???s.

The only annoying feature about this program is the speed at which the output is printed. As I originally structured the program it printed much slower than 300 baud, so I did a major rewrite and played around with a ML subroutine for buffering disk I/O. But I found no significant increase in speed, and so I present you with the fastest version of *Lixter.*

Hacker notes: Control codes may be redefined as may keywords, but beware of changing mnemonics that start with the letter B as they are critical in the program. ☐

SEE PROGRAM LISTING ON PAGE 136

DARK FORTRESS

For the C-128

By Cleveland M. Blakemore

A double screen game for the C-128. Requires both 80 and 40 column monitors and two joysticks.



If you have not purchased one by now, I would highly recommend the C-128 to you as a very sharp buy. Although it may seem to be nothing more than a hyperactive C-64 at first, you will soon discover (as I did) that you have acquired a rather remarkable piece of hardware for a ridiculously low price. It will take a while for the applications software to build up a market, because many developers are not quite sure how they should take advantage of the extra memory and power the C-128 possesses.

The next time somebody asks you what your C-128 can do that your C-64 can't, show them this game!

Almost every review I have read of the machine has casually mentioned the possibility of "double screen games"—an idea just waiting for someone to come along and implement it. Because the C-128 can maintain both 80 and 40 column screen displays independently, it follows that you could create some very interesting games controlled by separate players, each with a display screen hidden from the other player.

It just so happens that this type of game has long been the pipe dream of fantasy adventurists. Almost every computerist has dreamed of a fantasy adventure orchestrated by a single computer, with a monitor and controls for each player, so everyone could participate independently in a game controlled by an ultimately objective, flawless "Dungeon Master."

Well, not only is this pipe dream a possibility, it is now

a reality with this fantasy adventure game, *Dark Fortress.*

As of this writing, there is no commercial software (that I know of) that uses the two screen capabilities like this game.

Dark Fortress is a menu-driven text game that is played on a massive map of ShadowThorn Mountain. The object of the game is to find the three precious treasures in the game (DIAMOND, EMERALD, PEARL) and return them to the trophy case beneath the "Adventurer's Lounge" before the other player.

The game is filled with monsters, magic, myths, and mayhem–enough to keep almost any dungeon explorer happy. There are complex puzzles to solve, creatures both friend and foe, and even an underworld beneath the Fortress.

The game is in BASIC, and runs fairly slowly, but not so slow as to be annoying. You should have the 40/80 column key on the top of your keyboard locked down before you load the program. To play the game, you will need either a composite monitor or TV hooked up to the composite output, and an 80 column device, either monochrome or color, hooked up to the RGB output. If you have a Commodore 1902, you can hook that up to the RGB, and use any old black-and-white (or color) TV set you might have sitting around for the composite. Any configuration with both an 80 and 40 column monitor will work. The game uses no graphics, so color is not important. You should set the two monitors up so that neither player can see the other's screen.

Players alternate turns, controlling their moves with the joystick that applies to their player number. A chime sounds each time the computer changes players.

Player one will use the joystick plugged into Port 1. Player two will use the joystick in Port 2. Whichever screen the game is initially run from, either 80 or 40 columns, that monitor will correspond to "Player ONE."

Each player has a total of 18 different verbs he can command from the menu in the game. Discovering what the commands do and how to use them is part of the game. They are as follows:

Six Directions:	Speak
N,S,E,W,Up and Down	Lock/Unlock
Inventory: Displays possessions.	Use
Attack	Drink
Take, Drop	Trade
Incant, Cast Spell	Read

There are 13 different kinds of objects in the game, which you can pick up, drop, or use in some way which is beneficial. You can never carry more than four objects at a time.

To choose options from the menu, move the joystick up or down. When the option you want to use is highlighted, push the joystick button. All choices during the game will be in the same menu format. To exit any menu without a choice, highlight the last command, which will usually be "NOTHING".

This program makes extensive use of the windowing feature of the C-128. There are three basic windows in the game.

The upper five lines of the screen are reserved for location descriptions, directions, and messages.

The lower left window is always the menu window. Your menu options will always appear in this window.

The lower right window is used either for inventory, or a description of items or monsters present in the room with you. Player inventory displays objects currently in possession, and the amount of gold the player is carrying.

The bar at the bottom of the screen is the status bar. It will tell you whether it is your turn (waiting for option) or the program is processing the other player's turn.

The game does not allow combat between players, only between players and monsters. It does tend to encourage cooperation, though, and often requires compromises between players. Trading is a necessity here.

Supplies and magic can be purchased from the trading post outside the lounge if you have enough gold. Each player begins the game with one RESURRECTION spell in the event he is killed. After that he is on his own. Many of the magic spells are very useful. Others are helpful, but unnecessary. You will have to experiment to find which does what.

If you are killed, you will have to find a way out of Hades, or be doomed to remain there forever. The other player can get you out of Hades if he does the right thing in the right place, which he may be willing to do if you have something in your possession he wants. Otherwise you remain there indefinitely.

Some of the creatures in the game are neutral or friendly. But most are lethal unless you fight back with either a sword or staff (or both) and kill them. Slaying creatures brings you increased strength and riches. The more powerful the creature you slay, the more gold he will have.

If you and the other player team up on a single monster, the one who delivers the killing blow gets the gold and extra stamina.

If you exit a room during combat and return, the creature will be rested up when you come back. The really tough creatures are best fought in tandem with your opponent at the other monitor.

Hints and riddles can be found throughout the game. Think logically and use your wits to solve them. Most problems need special equipment to tackle. Talk to the inhabitants, read anything you see (or don't see), and experiment with different approaches until you succeed. Important tools can only be bought at the trading post when you have enough gold. Even after you have won the game, I guarantee there will be mysteries in the game yet to return to!

When you have all three treasures, go to the trophy room, unlock the case, and drop all three treasures to win the game.

Because there could be a great deal of dissent as to when to save the game, I did not include a save feature in *Dark Fortress.* Playing a complete game could take two to three hours. Perhaps if this game is received well I will include a separate file save for both players in a

future double screen game.

Game strategy varies enormously. Since you can only carry four objects at a time, you will often try to find a safe place to hide your important stuff while you venture off into the Fortress. You can try locking it up in different places, in the hope your opponent will not find the right key. You may have to trade, bargain, or plead with the other player to get his help. If you lose your lantern, you may have to follow the other player out, or wander in darkness. You may have to make several repeat trips to different locations, or even double back to get something you left behind.

When you are killed, be persistent. There is a way out of Hades, in fact several ways. The sooner you escape, the less time your opponent has to work unhindered by your presence in the game. If you are really sharp, there is a way to punch a permanent exit out of the "Land of Hades."

As with all text games, the key is to think in an orderly fashion. What type of key do you think would open a silver door–a copper key, an iron key, or a silver key? Read the room descriptions well; is there a possible hiding place in the area you are in? How do you uncover it?

A map of the *Dark Fortress* will be published in a future issue for despondent adventurers; or send a stamped and self-addressed envelope to *Ahoy!*/Dark Fortress Map, Ion International Inc., 45 West 34th Street–Suite 407, New York, NY 10001 to receive the map immediately. But most mapping of the game is simple, with the exclusion of the HedgeMaze, which can be very confusing. Dropping objects in the maze can help you keep track of where you are.

The game has REM statements at all the major routines, so you should be able to modify it with ease if you are a middling to advanced BASIC programmer. Adding new rooms should be very simple, which I imagine you may want to do if you have thoroughly explored ShadowThorn Mountain. The memory capacity of the C-128 being what it is, a good programmer could expand this game to a size exceeding *Zork*, or even larger. The 160 space line length of the C-128 makes it possible to give much more explicit room descriptions than text games on the C-64. Many times while programming on the C-64 I have wished for just another line or two of text in a DATA statement.

I am considering a science fiction game in the same format as this one, which you may see in an upcoming issue of *Ahoy!* Give the editors some feedback, and they will let me know whether or not to proceed! Would you like to see something larger? Smaller? More complex, or less challenging? A save feature? Graphics?

I hope that you find the *Dark Fortress* immensely entertaining. See you at the Trading Post! □

SEE PROGRAM LISTING ON PAGE 128

COMMODARES
PROGRAMMING CHALLENGES

By Dale Rupert

Each month, we'll present several challenges designed to stimulate your synapses and toggle the bits in your cerebral random access memory. We invite you to send your solutions to:

Commodares, c/o *Ahoy!*
P.O. Box 723
Bethel, CT 06801

We will print and discuss the cleverest, simplest, shortest, most interesting and/or most unusual solutions. Be sure to identify the *name* and *number* of the problems you are solving. Also show sample runs if possible. Be sure to tell what makes your solutions unique or interesting, if they are.

Programs on diskette (1541 format only) are welcome, but they must be accompanied by listings. You must enclose a stamped, self-addressed envelope if you want any of your materials returned. Solutions received by the middle of the month shown on the magazine cover are most likely to be discussed, but you may send solutions and comments any time. Your original programming problems, suggestions, and ideas are equally welcome. The best ones will become *Commodares*!

PROBLEM #37-1: MAGIC SQUARE

This problem was submitted by Karen Middaugh (San Diego, CA). Let your computer do the thinking to put 5, 10, 15, 35, 40, and 45 in the appropriate blank squares so that the sum in each direction (horizontal, vertical, and diagonal) is 75.

20		
	25	
		30

PROBLEM #37-2: OUTCAST ORDER

Here is a tough one from Thomson Fung (San Diego, CA). There are N persons, numbered 1 through N, arranged in a circle. Beginning with person number 1, go around the circle and cast out every Mth person. The circle closes after each person is cast out, and counting resumes with the next person. Write a program to print out the order of being cast out for specified values of M and N.

For example, let N=4 and M=3. Assume the people are numbered clockwise 1 through 4, and counting begins at #1. The first outcast is #3 (count 1,2,3). Now the circle consists of #1, #2, and #4. Since counting stopped at #3, it begins with #4. Count 4, 1, 2, and the next outcast is #2. Counting resumes with #4, and #4 is the next outcast (count 4,1,4). Consequently #1 is the last outcast. Your program should display the order of outcasts as 3, 2, 4, 1. For N=5 and M=3, the order is 3, 1, 5, 2, 4.

PROBLEM #37-3: POWER PRODUCT

Oren Dalton (El Paso, TX) said that this problem was solved by C.W. Trigg in the 1930's without a computer. See if you can solve it with a computer. Find all solutions for digits A, B, C, and D, if any, to make this expression true: [ABCD] =(A ↑ B)*(C ↑ D) where the quantity on the left represents a four-digit number, not the product of four single-digit numbers. A ↑ B means A raised to the B power.

PROBLEM #37-4: PHRASE REVERSER

Here is one for novices and experts alike, suggested by Leo Brenneman (Erie, PA). The user types a sentence or phrase and presses RETURN. The computer reprints the phrase in reverse order. For novices, the entire phrase should be reversed. For experts, the reversal occurs on a word-by-word basis. For example, "WE LOVE COMMODARES" becomes

Novice: SERADOMMOC EVOL EW
Expert: EW EVOL SERADOMMOC

This month we will reveal the best solutions to the September 1986 *Commodares.* Bill Okerblom (Providence, RI) suggested *Problem #33-1: Variable Log.* The problem was to generate a checklist of all unique floating-point variable names. The first character must be a let-

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Calc. Result Adv.	Practicalc II
Calc. Result Easy	Printers
Comal (1.4)	Epson RX80
The Consultant	Gemini 10X
Disk 1541	1525/801
Doodle	Microline
Easy Script	Quick Brown Fox
Elite	Pocket Writer
Fleet System II	Simon's Basic
Flight Simulator II	Sky Travel
For the Beginner	Speedscript
GEOS	Sprites Only
Hes Writer	Superbase 64
Logo Sheet 1	Terminals
Logo Sheet 2	Smart64
The Manager	Vidtex
Multiplan	VIP
Newsroom	Word Proc 3+
Omniwriter	Word Pro 64

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ter, and the second character, if any, must be a letter or a one-digit number. (According to the *Programmer's Reference Guide,* anyway. More on that later.)

Here are two approaches suggested by Joe Wright (Louisville, KY):

```
•1 REM COMMODARES PROBLEM #33-1:
•2 REM    VARIABLE LOG
•3 REM SOLUTION BY
•4 REM    JOE WRIGHT
•5 REM
•9 REM === 1ST SOLUTION ===
•10 A$="ABCDEFGHIJKLMNOPQRSTUVWXYZ 012345
 6789" : FOR X=1 TO 26 : FOR Y=1 TO 37
•20 PRINT MID$(A$,X,1);MID$(A$,Y,1);"  ";
 : NEXT : NEXT
•30 REM === 2ND SOLUTION ===
•40 FOR X=65 TO 90 : FOR Y=48 TO 90 : IF
 Y=58 THEN Y=65
•50 PRINT CHR$(X);CHR$(Y);"  ";
•60 NEXT : PRINT CHR$(X);"[3" "]"; : NEXT
```

There are 26 possibilities for the first character (A-Z), and 37 possibilities for the second character (A-Z, space, 0-9). The two FOR-NEXT loops in the first solution simply pick every appropriate combination of two characters from A$.

The second solution uses the ASCII values of the letters (65 - 90) and numbers (48 - 57) in the CHR$ statements. Notice how the Y FOR-NEXT loop in line 40 skips over the unwanted ASCII values 58 through 64. Can you figure out the purpose of the second PRINT statement in line 60 between the two NEXT statements?

The purpose of the program is to make a checklist for keeping track of variables used in a program, so you might prefer to send the output to the printer instead of to the screen. For a printout, add an OPEN statement at the beginning of the program, such as OPEN 4,4. A clever way to build in the flexibility of screen or printer output is the following suggested by David Shobe:

```
6 INPUT "SCREEN OR PRINTER (S/P)";DV$
7 DV = 4 + (DV$="S")
8 OPEN 4,DV
```

If the user specifies P for printer output, the expression (DV$ = "S") is false and thereby has a value of zero. The value of DV is then 4, and line 8 OPENs device 4, which is the printer. If the user specifies S, then (DV$ = "S") is true and has a value of −1. Now device 3, the screen, is OPENed in line 8. Be sure to replace each "PRINT" statement with "PRINT#4," in lines 20, 50, and 60. You should add 70 PRINT#4 : CLOSE 4 as well.

David Shobe also sent an interesting tidbit regarding allowable variable names. He pointed out that "I F" is a valid variable name, since there is a space between the I and the F. See for yourself that "I F=3" is a valid statement, whereas "IF=3" gives a syntax error since "IF" is a reserved word. Some experimentation will show you that "I<space>F" is different from "I<space>G", but that "I<space>G" is the same as "IG". Just when you thought you knew all there was to know about variable names!

There were numerous responses to *Problem #33-2: Sentence Disassembler.* The problem from Steven Steckler (Columbia, MD) was to display each word in a sentence along with a count of its letters, and also to show the total count of letters in the sentence. This solution from J.V. Henry (North Fork, CA) does just that:

```
•1 REM COMMODARES PROBLEM #33-2:
•2 REM   SENTENCE DISASSEMBLER
•3 REM SOLUTION BY
•4 REM   J.V. HENRY
•5 REM
•10 INPUT"[CLEAR]A PHRASE OR SENTENCE";S$
•20 L=LEN(S$) : H$=""
•30 FOR I=1 TO L : H1$=MID$(S$,I,1)
•40 IF H1$<>" " THEN H$=H$+H1$
•50 IF H1$=" " OR I=L THEN J=I : I=L
•60 NEXT
•70 IF LEN(H$)>0 THEN PRINT H$;TAB(25)LEN
 (H$) : LE=LE + LEN(H$)
•80 S$=RIGHT$(S$,L-J) : IF L-J>0 THEN 20
•90 PRINT TAB(25);"[c T][c T]" : REM COMM
 ODORE-T
•100 LE$=STR$(LE) : L2=LEN(LE$)
•110 PRINT CHR$(34)+"TOTAL CHARACTERS"+CH
 R$(34)+" =" ;TAB(27-L2);LE
```

S$ stores the entire sentence initially. The FOR-NEXT loop searches for the first space character delimiting the first word. The first word and its letter count are displayed by line 70. Line 80 chops the first word from S$, and the process is repeated at line 20. LE keeps track of the total letter count. When all words have been removed from S$, L−J > 0 in line 80 is false and line 90 is executed. Lines 100 and 110 format and print the bottom line. Line 110 shows how to put quotation marks (CHR$(34)) in your printed output. The calculation in the TAB statement ensures that the bottom number is right-justified.

This solution from Jim Speers (Niles, MI) is for the C-128:

The INSTR function looks for the first occurrence of a space within S$, beginning with the Bth character in S$. If a space is found, then X is unequal to 0, and line 30 is executed. Line 30 prints the word and its count. B is incremented so that the next INSTR search starts with the next character in S$.

Some of the fancier solutions to this problem looked for punctuation marks and deleted them from the output. You might enjoy modifying either of these programs to do that.

Problem #33-3: Bouncing Balls from M.N. Carswell (Eatonton, GA) was a good challenge. The idea is to

bounce a ball off the screen edges and off of graphics characters. This solution from David Shobe works on both the C-64 and the C-128 (40-column screen).

```
•1 REM COMMODARES PROBLEM #33-2:
•2 REM   SENTENCE DISASSEMBLER
•3 REM SOLUTION BY
•4 REM    JIM SPEERS
•5 REM --- C-128 ---
•10 POKE 842,34:POKE 208,1:INPUT"[CLEAR][
DOWN]SENTENCE";S$ : W$="" : B=1
•20 X=INSTR(S$," ",B):IF X=0 THEN PRINT M
ID$(S$,B,99)TAB(18);LEN(S$)-B+1:T=T+LEN(
S$)-B+1:PRINTTAB(19)"[3"[c T]"]":PRINT"T
OTAL"TAB(18);T:END
•30 PRINT MID$(S$,B,X-B)TAB(18);X-B : T=T
+X-B : B=X+1 : GOTO 20
```

Jim uses the dynamic keyboard technique in line 10 to stuff a quotation mark into the input buffer. The keyboard buffer in the C-128 starts at location 842. The number of characters in the buffer is stored in location 208. POKEing the quotation mark character (34) into the input buffer allows the user to enter commas and colons (anything else?) into the input sentence without the ?EXTRA IGNORED error. Jim's program treats commas and other punctuation as letters.

```
•1 REM COMMODARES PROBLEM #33-3:
•2 REM      BOUNCING BALLS
•3 REM SOLUTION BY
•4 REM      DAVID SHOBE
•5 REM
•100 PRINT"[CLEAR]":X=RND(1-TI)
•110 POKE 53280,7:POKE 53281,2:PRINT"[WHI
TE]"
•120 FOR C=55296 TO 56295:POKE C,0:NEXT
•130 FOR L=1 TO 25
•140 POKE 1024+INT(RND(1)*1000),102
•150 NEXT
•160 A=0:Q=100
•170 X=1:Y=1
•180 DX=1:DY=1
•190 POKE 1024+X+40*Y,81
•200 FOR T=1 TO 10:NEXT
•210 POKE 1024+X+40*Y,32
•220 X=X+DX
•230 IF PEEK(1024+X+40*Y)=102 THEN DX=-DX
:GOSUB 400:GOTO 220
•240 IF X<=0 OR X>=39 THEN DX=-DX
•250 Y=Y+DY
•260 IF PEEK(1024+X+40*Y)=102 THEN DY=-DY
:GOSUB 400:GOTO 250
•270 IF Y<=0 OR Y>=24 THEN DY=-DY
•280 GOTO 190
```

```
390 REM --- SOUND ---
400 FOR L=54272 TO 54296:POKE L,0:NEXT
410 POKE 54296,15
420 POKE 54277,64
430 POKE 54273,17 : POKE 54272,37
440 POKE 54276,17 : FOR T=1 TO 200:NEXT
450 POKE 54276,16 : FOR T=1 TO 50:NEXT
460 RETURN
```

There are many ways to modify this program. Put some special shapes such as parallel lines, for example, on the screen to create rhythmic motion of the ball rather than just random motion. Modify the sound routine starting at line 400 to produce different sounds for different objects. The action is more realistic if the sound routine is not used or is shortened, since it takes a noticeable amount of time. Working with this program can be as much fun as watching it.

For C-128 users we have the following solution from Jim Speers (Niles, MI):

```
1 REM COMMODARES PROBLEM #33-3:
2 REM      BOUNCING BALLS
3 REM SOLUTION BY
4 REM      JIM SPEERS
5 REM
10 INPUT"SPEED (0=FAST TO 9=SLOW)";SP : SP=SP*50 : X=RND(-TI)
20 COLOR 0,1:COLOR 4,3:COLOR 1,11:GRAPHIC 1,1:CIRCLE 1,11,12,10,8:PAINT 1,11,11
30 SSHAPE A$,0,0,23,20:SPRSAV A$,1:FOR I=2 TO 8:SPRSAV 1,I:NEXT:GRAPHIC 1,1
40 FOR I=1 TO 8:SPRITE I,1,I+1,1:MOVSPR I,85+21*I,140:NEXT
50 FOR I=1 TO 12:R=INT(RND(1)*25):C=INT(RND(1)*40):CHAR 1,C,R,"X":NEXT
60 X=INT(RND(1)*360):FOR I=2 TO 8:A(I)=270:NEXT:A(1)=X:TM=TI+7200
70 FOR I=1 TO 8:MOVSPR I,21;A(I):NEXT
80 IF (BUMP(2)AND1)<>1 THEN 110
90 SC=SC+1 :X=X+INT(RND(1)*120)-60 : IF X>360 THEN X=X-360
100 IF X<0 THEN X=X+360
110 FOR I=8 TO 2 STEP-1:A(I)=A(I-1):NEXT
120 IF RSPPOS(1,1)>222 AND (X>=90ANDX<=270) THEN X=(360-2*X)/2:IFX<0THENX=X+360
130 IF RSPPOS(1,1)<50 AND (X<90 OR X>270)THEN X=(360-2*X)/2:IFX<0THENX=X+360
140 IF RSPPOS(1,0)<21 AND X>=180 THEN X=360-X
150 IF RSPPOS(1,0)>318 AND X<180 THEN X=360-X
160 IF TI>TM THEN 220
170 GET Z$:IF Z$="Q" THEN 220
180 IF ASC(Z$)>47 AND ASC(Z$)<58 THEN SP=50*(ASC(Z$)-48)
190 IF Z$="/" THEN X=X+15:IF X>360 THEN X=X-360
200 IF Z$="Z" THEN X=X-15:IF X<0 THEN X=X+360
210 FOR I=1 TO SP:NEXT:A(1)=X:GOTO 70
220 FOR I=1 TO 8:SPRITE I,0:NEXT:GRAPHIC 0,1:PRINT"SCORE:";SC:END
```

Jim admits he got carried away with this one. He has turned the program into a game in which you control the direction of motion of the eight sprites with the "/" and "Z" keys. You may try either to hit or to miss the graphics characters. After two minutes, your score is displayed. If you have never tried some of these fancy sprite control commands, here is your chance to get started. Some temptations which Jim was able to resist for this program include sound, control of sprites with a joystick, and multiple players. Perhaps your willpower is weaker.

Readers didn't have too much trouble solving *Problem #33-4: Counting Combinations* submitted by Jim Speers. Finding the best solution was more difficult. The problem was simply to calculate the number of ways of choosing R items from N possible choices, that is, calculate the number of combinations of N things taken R at a time. For example, a lottery game requires a person to choose 6 numbers from a total of 45 numbers. The order in which the numbers are chosen does not matter.

The formula for computing combinations is N!/(R!*(N−R)!) where "!" means "factorial." Five factorial (5!)

is 5*4*3*2*1 or 120. The number of combinations of 5 objects taken 3 at a time is

```
5!/(3!*2!) = 5*4*3*2*1 / (3*2*1 * 2*1) =
120/12 =10
```

Consequently there are ten different groups of three digits each that can be chosen from the digits 12345. (Can you write them all down? Remember that order doesn't matter, so 123 is the same choice as 213.)

Some algebraic maneuvering simplifies the formula for combinations. Assume N is 8 and R is 5. The formula can be written 8*7*6*(5!) / (5! * 3!). The 5! in numerator and denominator divide out, leaving 8*7*6 / 3!. Instead of requiring seven multiplications in both the numerator and the denominator, we need only two in each.

Most readers calculated the numerator, then the denominator, and then their quotient. This can lead to overflow errors more quickly than a program which alternately divides and multiplies. Take the first term from the top, divide by the first term from the bottom, multiply by the second term on top, divide by the second term on bottom, and so forth. A much greater range of numbers can be handled this way, since the intermediate results are relatively small.

Jim Speers' solution to his own problem optimized the calculation:

```
·1 REM COMMODARES PROBLEM #33-4:
·2 REM    COUNTING COMBINATIONS
·3 REM SOLUTION BY
·4 REM    JIM SPEERS
·5 REM
·10 INPUT"ENTER N,R";N,R:IF N<R THEN 10
·20 N$=STR$(N) : R$=STR$(R)
·30 IF N=0 THEN END
·40 IF N=R OR R=0 THEN T=1 : GOTO 70
·50 IF (N-R)<R THEN R=N-R
·60 T=1 : FOR I=1 TO R : T=T*N/I : N=N-1
 : NEXT
·70 PRINT"[DOWN]THERE ARE";T;"COMBINATION
 S OF"
·80 PRINT N$;" THINGS TAKEN ";R$;" AT A T
 IME."
·90 PRINT"[DOWN][DOWN]" : GOTO 10
```

Since "N taken R at a time" is equivalent to "N taken (N−R) at a time," line 50 guarantees that the smaller number of terms (R or N−R) is used in the denominator. The running total is kept in T. Line 60 causes I to count up from 1 to R while N counts down from N to N−R, and T is updated with their quotient. Enter 0,0 to end the program.

Jim mentioned that a lottery game changed from picking 6 out of 40 numbers to picking 6 out of 44 numbers. To the uninitiated, this may not seem like a significant difference. In fact the difference is nearly two to one. There are 3,838,380 different combinations in the first game (N=40, R=6) whereas there are 7,059,052 combinations in the second game. The odds of the state picking your particular group of six numbers are roughly half as great in the second game as in the first. (Can you believe that people make money selling books telling how to pick numbers for these games? The size of the number of possible combinations tells me all I need to know.)

Test your intuition with these problems. If the game involved picking 7 out of 40 numbers instead of 6 out of 40, are your chances of winning greater or less, and by how much? Are you more likely to pick a winning combination by choosing 34 out of 40 numbers or by choosing 6 out of 40 numbers? Check your answers with Jim's program. Best of luck until next month. If you play games with these odds, you need it.

Congratulations also to these readers for their solutions this month:

C. Artino (Guilderland, NY)
Leo Brenneman (Erie, PA)
Steve Christensen (Manton, MI)
Curt Donofrio (Shelton, CT)
Craig Ewert (Crystal Lake, IL)
Bill Feyler (Pleasant Plain, OH)
Thomson Fung (San Diego, CA)
Charles Grady (Cleveland, TN)
Chris Haywood (Naperville, IL)
James Killman (Memphis, TN)
Scott McClare (Espanola, ONT)
Frank Michels (Deptford, NJ)
Johnny Moon (Broxton, GA)
Jason Murphy (Baltimore, MD)
Ivan Rudyk
Robb Schermer (Zeeland, MI)
Joshua Schneider (Tampa, FL)
J.H. Smalley (Boulder, CO)
Paul Sobolik (Pittsburgh, PA)
S. Steckler (Columbia, MD)
Joe Vasey (Satellite Beach, FL)

PROGRAM LISTINGS

Attention new *Ahoy!* readers! You must read the following information very carefully prior to typing in programs listed in *Ahoy!* Certain Commodore characters, commands, and strings of characters and commands will appear in a special format. Follow the instructions and listing guide on this page.

On the following pages you'll find several programs that you can enter on your Commodore computer. But before doing so, read this entire page carefully.

To insure clear reproductions, *Ahoy!*'s program listings are generated on a daisy wheel printer, incapable of printing the commands and graphic characters used in Commodore programs. These are therefore represented by various codes enclosed in brackets [ ]. For example: the SHIFT CLR/HOME command is represented onscreen by a heart. The code we use in our listings is [CLEAR]. The chart below lists all such codes which you'll encounter in our listings, except for one other special case.

The other special case is the COMMODORE and SHIFT characters. On the front of most keys are two symbols. The symbol on the left is obtained by pressing that key while holding down the COMMODORE key; the symbol on the right, by pressing that key while holding down the SHIFT key. COMMODORE and SHIFT characters are represented in our listings by a lower-case "s" or "c" followed by the symbol of the key you must hit. COMMODORE J, for example, is represented by [c J], and SHIFT J by [s J].

Additionally, any character that occurs more than two times in a row will be displayed by a coded listing. For example, [3 "[LEFT]"] would be 3 CuRSoR left commands in a row, [5 "[s EP]"] would be 5 SHIFTed English Pounds, and so on. Multiple blank spaces will be noted in similar fashion: e.g., 22 spaces as [22 " "].

Sometimes you'll find a program line that's too long for the computer to accept (C-64 lines are a maximum of 80 characters, or 2 screen lines long; VIC 20 lines, a maximum of 88 characters, or 4 screen lines). To enter these lines, refer to the *BASIC Command Abbreviations Appendix* in your User Manual.

On the next page you'll find our *Bug Repellent* programs for the C-128 and C-64. The version appropriate for your machine will help you proofread our programs after you type them. (Please note: the *Bug Repellent* line codes that follow each program line, in the whited-out area, should *not* be typed in. See the instructions preceding each program.)

Also on the following page you will find *Flankspeed*, our ML entry program, and instructions on its use. ☐

Call *Ahoy!* at 212-239-0855 with any problems.

When You See	It Means	You Type	You Will See
[CLEAR]	Screen Clear	SHIFT CLR/HOME	
[HOME]	Home	CLR/HOME	
[UP]	Cursor Up	SHIFT ↑CRSR↓	
[DOWN]	Cursor Down	↑CRSR↓	
[LEFT]	Cursor Left	SHIFT ←CRSR→	
[RIGHT]	Cursor Right	←CRSR→	
[SS]	Shifted Space	SHIFT Space	
[INSERT]	Insert	SHIFT INST/DEL	
[DEL]	Delete	INST/DEL	
[RVSON]	Reverse On	CNTRL 9	
[RVSOFF]	Reverse Off	CNTRL 0	
[UPARROW]	Up Arrow	↑	
[BACKARROW]	Back Arrow	←	
[PI]	PI	π	
[EP]	English Pound	£	

When You See	It Means	You Type	You Will See
[BLACK]	Black	CNTRL 1	
[WHITE]	White	CNTRL 2	
[RED]	Red	CNTRL 3	
[CYAN]	Cyan	CNTRL 4	
[PURPLE]	Purple	CNTRL 5	
[GREEN]	Green	CNTRL 6	
[BLUE]	Blue	CNTRL 7	
[YELLOW]	Yellow	CNTRL 8	
[F1]	Function 1	F1	
[F2]	Function 2	SHIFT F1	
[F3]	Function 3	F3	
[F4]	Function 4	SHIFT F3	
[F5]	Function 5	F5	
[F6]	Function 6	SHIFT F5	
[F7]	Function 7	F7	
[F8]	Function 8	SHIFT F7	

BUG REPELLENT By MICHAEL KLEINERT and DAVID BARRON

Bug Repellent is a checksum program used for proofreading BASIC listings typed in from *Ahoy!* magazine. For each program line you enter, *Bug Repellent* will produce a two-letter code that should match the code listed beside that line in the magazine.

Type in, save, and run the *Bug Repellent.* (If you have a C-64, type in the C-64 version. If you have a C-128, you will need to type in the C-64 version for use with C-64 programs, and the C-128 version for use with C-128 programs.) If you have typed in *Bug Repellent* properly, you will get the message BUG REPELLENT INSTALLED; otherwise you will get an error message. If you get an error message, double check the *Bug Repellent* program for typing mistakes. Type NEW and hit RETURN. Then type in and save, or load, the *Ahoy!* program you wish to check. Type in SYS 49152 for the C-64 version or SYS 3072 for the C-128 version and hit RETURN (this will begin execution of *Bug Repellent*). You will see the prompt SCREEN OR PRINTER ? Hit S if you want the codes listed on the screen, or P if you want them listed on the printer. To pause the listing depress and hold the SHIFT key.

Compare the codes your machine generates to those listed to the right of the corresponding program lines. If you spot a difference, that line contains an error. Write down the numbers of the lines where the contradictions occur. LIST each line, locate the errors, and correct them.

COMMODORE 64 VERSION

```
·100 FOR X = 49152 TO 49488:READY:S=S+Y             AB
·110 IF Y<0 OR Y>255 THEN 130                       EA
·120 POKE X,Y:NEXT:GOTO140                          ID
·130 PRINT"[CLEAR][DOWN]**ERROR**":PRINT"[DOWN
]PLEASE CHECK LINE"PEEK(64)*256+PEEK(63):END       ID
·140 IF S<>44677 THEN PRINT"[CLEAR][DOWN]**ERR
OR**":PRINT"[DOWN]PLEASE CHECK DATA LINES 170
-500":END                                           HJ
·150 PRINT"[CLEAR]":POKE53280,0:POKE53281,6:PO
KE646,1                                             NP
·160 PRINT"[RVSON][6" "]C-64 BUG REPELLENT INS
TALLED[6" "]"                                       LF
·170 DATA32,161,192,165,43,133,251,165,44,133       DL
·180 DATA252,160,0,132,254,32,37,193,234,177        DB
·190 DATA251,208,3,76,138,192,230,251,208,2         OF
·200 DATA230,252,76,43,192,76,73,78,69,32           KN
·210 DATA35,32,0,169,35,160,192,32,30,171           CA
·220 DATA160,0,177,251,170,230,251,208,2,230        CE
·230 DATA252,177,251,32,205,189,169,58,32,210       JE
·240 DATA255,169,0,133,253,230,254,32,37,193        CL
·250 DATA234,165,253,160,0,76,13,193,133,253        NB
·260 DATA177,251,208,237,165,253,41,240,74,74       MB
·270 DATA74,74,24,105,65,32,210,255,165,253         EP
·280 DATA 41,15,24,105,65,32,210,255,169,13         GH
·290 DATA32,220,192,230,63,208,2,230,64,230         AN
·300 DATA251,208,2,230,252,76,11,192,169,153        NG
·310 DATA160,192,32,30,171,166,63,165,64,76         BF
·320 DATA231,192,96,76,73,78,69,83,58,32            EP
·330 DATA0,169,247,160,192,32,30,171,169,3          PJ
·340 DATA133,254,32,228,255,201,83,240,6,201        FK
·350 DATA80,208,245,230,254,32,210,255,169,4        FL
·360 DATA166,254,160,255,32,186,255,169,0,133       CL
·370 DATA63,133,64,133,2,32,189,255,32,192          GC
·380 DATA255,166,254,32,201,255,76,73,193,96        NN
·390 DATA32,210,255,173,141,2,41,1,208,249          NH
·400 DATA96,32,205,189,169,13,32,210,255,32         IM
·410 DATA204,255,169,4,76,195,255,147,83,67         KC
·420 DATA82,69,69,78,32,79,82,32,80,82              DC
·430 DATA 73,78,84,69,82,32,63,32,0,76              ML
·440 DATA44,193,234,177,251,201,32,240,6,138        GN
·450 DATA113,251,69,254,170,138,76,88,192,0         JK
·460 DATA0,0,0,230,251,208,2,230,252,96             NA
·470 DATA170,177,251,201,34,208,6,165,2,73          DM
·480 DATA255,133,2,165,2,208,218,177,251,201        JA
·490 DATA32,208,212,198,254,76,29,193,0,169         FM
·500 DATA13,76,210,255,0,0,0                        PA
```

COMMODORE 128 VERSION

```
·100 FAST:FOR X = 3072 TO 3520:READ Y:POKE X,Y
:S=S+Y:TRAP110:NEXT:SLOW                            IH
·110 SLOW:IF S<>49057 THEN PRINT"[CLEAR][DOWN]
**ERROR**":PRINT"[DOWN]PLEASE CHECK DATA LINE
S 140-390":END                                      JA
·120 PRINT"[CLEAR][DOWN] C-128 BUG REPELLENT
INSTALLED"                                          II
·130 PRINT"[4" "]TYPE SYS 3072 TO ACTIVATE"         IN
·140 DATA 32,161,12,165,45,133,251,165,46,133,
252,160,0,132,254,32,37                             OF
·150 DATA 13,234,177,251,208,3,76,138,12,230,2
51,208,2,230,252,76,43                              NC
·160 DATA 12,76,73,78,69,32,35,32,0,169,35,160
,12,32,80,13,160,0,177                              OL
·170 DATA 251,170,230,251,208,2,230,252,177,25
1,32,89,13,169,58,32,98                             EF
·180 DATA 13,169,0,133,253,230,254,32,37,13,23
4,165,253,160,0,76,13                               JO
·190 DATA 13,133,253,177,251,208,237,165,253,4
1,240,74,74,74,74,24                                LC
·200 DATA 105,65,32,98,13,165,253,41,15,24,105
,65,32,98,13,169,13,32                              DE
·210 DATA 220,12,230,65,208,2,230,66,230,251,2
08,2,230,252,76,11,12                               GM
·220 DATA 169,153,160,12,32,80,13,166,65,165,6
6,76,231,12,96,76,73,78                             CP
·230 DATA 69,83,58,32,0,169,247,160,12,32,80,1
3,169,3,133,254,32,107                              HC
·240 DATA 13,201,83,240,6,201,80,208,245,230,2
54,32,98,13,169,4,166                               GK
·250 DATA 254,160,255,32,116,13,169,0,133,65,1
33,66,133,250,32,125,13                             LB
·260 DATA 32,134,13,166,254,32,143,13,76,73,13
,96,32,98,13,165,211                                JF
·270 DATA 234,41,1,208,249,96,32,89,13,169,13,
32,98,13,32,152,13,169,4                            GD
·280 DATA 76,161,13,147,83,67,82,69,69,78,32,7
9,82,32,80,82,73,78,84,69                           PL
·290 DATA 82,32,63,32,0,76,44,13,234,177,251,2
01,32,240,6,138,113,251,69                          OK
·300 DATA 254,170,138,76,88,12,0,0,0,0,230,251
,208,2,230,252,96,170,177                           FJ
·310 DATA 251,201,34,208,6,165,250,73,255,133,
250,165,250,208,218,177                             GA
·320 DATA 251,201,32,208,212,198,254,76,29,13,
0,169,13,76,98,13,0,0,32                            FI
·330 DATA 170,13,32,226,85,76,180,13,32,170,13
,32,50,142,76,180,13,32                             OF
·340 DATA 170,13,32,210,255,76,180,13,32,170,1
3,32,228,255,76,180,13,32                           AK
·350 DATA 170,13,32,186,255,76,180,13,32,170,1
3,32,189,255                                        BP
·360 DATA 76,180,13,32,170,13,32,192,255,76,18
0,13,32,170,13                                      FP
·370 DATA 32,201,255,76,180,13,32,170,13,32,20
4,255,76,180,13,32,170                              ID
·380 DATA 13,32,195,255,76,180,13,133,67,169,0
,141,0,255,165,67,96                                BJ
·390 DATA 133,67,169,0,141,1,255,165,67,96,0,0
,0                                                  IF
```

FLANKSPEED FOR THE C-64 By GORDON F. WHEAT

Flankspeed will allow you to enter machine language *Ahoy!* programs without any mistakes. Once you have typed the program in, save it for future use. While entering an ML program with *Flankspeed* there is no need to enter spaces or hit the carriage return. This is all done automatically. If you make an error in a line a bell will ring and you will be asked to enter it again. To LOAD in a program Saved with *Flankspeed* use LOAD "name",1,1 for tape, or LOAD "name",8,1 for disk. The function keys may be used after the starting and ending addresses have been entered.

f1 – SAVEs what you have entered so far.

f3 – LOADs in a program worked on previously.

f5 – To continue on a line you stopped on after LOADing in the previous saved work.

f7 – Scans through the program to locate a particular line, or to find out where you stopped the last time you entered the program. f7 temporarily freezes the output as well.

```
·100 POKE53280,12:POKE53281,11                                LL
·105 PRINT"[CLEAR][c 8][RVSON][15" "]FLANKSPEED[15" "]";      ED
·110 PRINT"[RVSON][5" "]MISTAKEPROOF ML ENTRY PROGRAM[6" "
 ]"                                                           MC
·115 PRINT"[RVSON][9" "]CREATED BY G. F. WHEAT[9" "]"         DM
·120 PRINT"[RVSON][3" "]COPR. 1984, ION INTERNATIONAL INC.
 [3" "]"                                                      DH
·125 FORA=54272TO54296:POKEA,0:NEXT                           IM
·130 POKE54272,4:POKE54273,48:POKE54277,0:POKE54278,249:PO
 KE54296,15                                                   NH
·135 FORA=680TO699:READB:POKEA,B:NEXT                         KO
·140 DATA169,251,166,253,164,254,32,216,255,96                HJ
·145 DATA169,0,166,251,164,252,32,213,255,96                  JB
·150 B$="STARTING ADDRESS IN HEX":GOSUB430:AD=B:SR=B          KA
·155 GOSUB480:IFB=0THEN150                                    GN
·160 POKE251,T(4)+T(3)*16:POKE252,T(2)+T(1)*16                KE
·165 B$="ENDING ADDRESS IN HEX":GOSUB430:EN=B                 LO
·170 GOSUB470:IFB=0THEN150                                    EE
·175 POKE254,T(2)+T(1)*16:B=T(4)+1+T(3)*16                    MN
·180 IFB>255THENB=B-255:POKE254,PEEK(254)+1                   GE
·185 POKE253,B:PRINT                                          HN
·190 REM  GET HEX LINE                                        IL
·195 GOSUB495:PRINT": [c P][LEFT]";:FORA=0TO8                 NH
·200 FORB=0TO1:GOTO250                                        MP
·205 NEXTB                                                    ME
·210 A%(A)=T(1)+T(0)*16:IFAD+A-1=ENTHEN340                    LE
·215 PRINT" [c P][LEFT]";                                     IK
·220 NEXTA:T=AD-(INT(AD/256)*256):PRINT" "                    PD
·225 FORA=0TO7:T=T+A%(A):IFT>255THENT=T-255                   LK
·230 NEXT                                                     IA
·235 IFA%(8)<>TTHENGOSUB375:GOTO195                           LE
·240 FORA=0TO7:POKEAD+A,A%(A):NEXT:AD=AD+8:GOTO195            BI
·245 REM    GET HEX INPUT                                     AB
·250 GETA$:IFA$=""THEN250                                     HK
·255 IFA$=CHR$(20)THEN305                                     HF
·260 IFA$=CHR$(133)THEN535                                    KH
·265 IFA$=CHR$(134)THEN560                                    JM
·270 IFA$=CHR$(135)THENPRINT" ":GOTO620                       EG
·275 IFA$=CHR$(136)THENPRINT" ":GOTO635                       AB
·280 IFA$>"@"ANDA$<"G"THENT(B)=ASC(A$)-55:GOTO295             DL
·285 IFA$>"/"ANDA$<":"THENT(B)=ASC(A$)-48:GOTO295             MD
·290 GOSUB415:GOTO250                                         JJ
·295 PRINTA$"[c P][LEFT]";                                    OA
·300 GOTO205                                                  CF
·305 IFA>0THEN320                                             PG
·310 A=-1:IFB=1THEN330                                        OI
·315 GOTO220                                                  BM
·320 IFB=0THENPRINTCHR$(20);CHR$(20);:A=A-1                   HG
·325 A=A-1                                                    BE
·330 PRINTCHR$(20);:GOTO220                                   LK
·335 REM LAST LINE                                            AD
·340 PRINT" ":T=AD-(INT(AD/256)*256)                          GJ
·345 FORB=0TOA-1:T=T+A%(B):IFT>255THENT=T-255                 PL
·350 NEXT                                                     IA
·355 IFA%(A)<>TTHENGOSUB375:GOTO195                           NF
·360 FORB=0TOA-1:POKEAD+B,A%(B):NEXT                          HN
·365 PRINT:PRINT"YOU ARE FINISHED!":GOTO535                   JA
·370 REM BELL AND ERROR MESSAGES                              FL
·375 PRINT:PRINT"LINE ENTERED INCORRECTLY":PRINT:GOTO415      DA
·380 PRINT:PRINT"INPUT A 4 DIGIT HEX VALUE!":GOTO415          FF
·385 PRINT:PRINT"ENDING IS LESS THAN STARTING!":B=0:GOTO41
 5                                                            HD
·390 PRINT:PRINT"ADDRESS NOT WITHIN SPECIFIED RANGE!":B=0:
 GOTO415                                                      OK
·395 PRINT:PRINT"NOT ZERO PAGE OR ROM!":B=0:GOTO415           FN
·400 PRINT"?ERROR IN SAVE":GOTO415                            PP
·405 PRINT"?ERROR IN LOAD":GOTO415                            PO
·410 PRINT:PRINT:PRINT"END OF ML AREA":PRINT                  PG
·415 POKE54276,17:POKE54276,16:RETURN                         BH
·420 OPEN15,8,15:INPUT#15,A,A$:CLOSE15:PRINTA$:RETURN         IM
·425 REM GET FOUR DIGIT HEX                                   PC
·430 PRINT:PRINTB$;:INPUTT$                                   GM
·435 IFLEN(T$)<>4THENGOSUB380:GOTO430                         NP
·440 FORA=1TO4:A$=MID$(T$,A,1):GOSUB450:IFT(A)=16THENGOSUB
 380:GOTO430                                                  FJ
·445 NEXT:B=(T(1)*4096)+(T(2)*256)+(T(3)*16)+T(4):RETURN      GF
·450 IFA$>"@"ANDA$<"G"THENT(A)=ASC(A$)-55:RETURN              EH
·455 IFA$>"/"ANDA$<":"THENT(A)=ASC(A$)-48:RETURN              KP
·460 T(A)=16:RETURN                                           NP
·465 REM ADRESS CHECK                                         LI
·470 IFAD>ENTHEN385                                           LB
·475 IFB<SRORB>ENTHEN390                                      KC
·480 IFB<256OR(B>40960ANDB<49152)ORB>53247THEN395             MG
·485 RETURN                                                   IM
·490 REM ADDRESS TO HEX                                       EB
·495 AC=AD:A=4096:GOSUB520                                    FD
·500 A=256:GOSUB520                                           PE
·505 A=16:GOSUB520                                            MI
·510 A=1:GOSUB520                                             IL
·515 RETURN                                                   IM
·520 T=INT(AC/A):IFT>9THENA$=CHR$(T+55):GOTO530               PE
·525 A$=CHR$(T+48)                                            JP
·530 PRINTA$;:AC=AC-A*T:RETURN                                AC
·535 A$="**SAVE**":GOSUB585                                   LH
·540 OPEN1,T,1,A$:SYS680:CLOSE1                               LH
·545 IFST=0THENEND                                            EO
·550 GOSUB400:IFT=8THENGOSUB420                               CM
·555 GOTO535                                                  CL
·560 A$="**LOAD**":GOSUB585                                   NE
·565 OPEN1,T,0,A$:SYS690:CLOSE1                               MF
·570 IFST=64THEN195                                           LC
·575 GOSUB405:IFT=8THENGOSUB420                               AN
·580 GOTO560                                                  CL
·585 PRINT" ":PRINTTAB(14)A$                                  FG
·590 PRINT:A$="":INPUT"FILENAME";A$                           OM
·595 IFA$=""THEN590                                           DD
·600 PRINT:PRINT"TAPE OR DISK?":PRINT                         DF
·605 GETB$:T=1:IFB$="D"THENT=8:A$="@0:"+A$:RETURN             IG
·610 IFB$<>"T"THEN605                                         BO
·615 RETURN                                                   IM
·620 B$="CONTINUE FROM ADDRESS":GOSUB430:AD=B                 OH
·625 GOSUB475:IFB=0THEN620                                    GH
·630 PRINT:GOTO195                                            PH
·635 B$="BEGIN SCAN AT ADDRESS":GOSUB430:AD=B                 FA
·640 GOSUB475:IFB=0THEN635                                    IB
·645 PRINT:GOTO670                                            PP
·650 FORB=0TO7:AC=PEEK(AD+B):GOSUB505:IFAD+B=ENTHENAD=SR:G
 OSUB410:GOTO195                                              NK
·655 PRINT" ";:NEXTB                                          EC
·660 PRINT:AD=AD+8                                            GN
·665 GETB$:IFB$=CHR$(136)THEN195                              LI
·670 GOSUB495:PRINT": ";:GOTO650                              IB
```

IMPORTANT! Letters on white background are **Bug Repellent** line codes. **Do not enter them!** Pages 109 and 110 explain these codes and provide other essential information on entering ***Ahoy!*** programs. Refer to these pages **before** entering any programs!

BASIC MAGIC

FROM PAGE 32

POINTER PRINTER

```
·1 REM                                          JD
·2 REM  -- POINTER PRINTER --                   KN
·3 REM     DEMO FOR THE C-128                   HC
·4 REM     RUPERT REPORT #37                    OP
·5 REM                                          JD
·6 REM  FUNCTIONS FIND DECIMAL VALUES OF        LB
·7 REM   POINTER AT ADDRESS M  (FNPTR)          HF
·8 REM   AND ITS MSB (FNHI) & LSB (FNLO)        EH
·9 REM                                          JD
·10 DEF FNPTR(M)=PEEK(M)+256*PEEK(M+1)          DM
·20 DEF FNHI(D)=DEC(LEFT$(HEX$(D),2))           FM
·30 DEF FNLO(D)=DEC(RIGHT$(HEX$(D),2))          DP
·40 M=45 : GOSUB 80   :REM  TXTTAB              CM
·50 M=4624 : GOSUB 80 :REM  TEXT-TOP            FF
·70 END :- - - - - - - - - - - - - - - -        JK
·75 REM  [M] IS THE VALUE OF THE POINTER        HJ
·76 REM  AT ADDRESS M.                          LG
·77 REM      IT IS SHOWN IN DECIMAL,            PM
·78 REM      HEXADECIMAL, AND IN                GE
·79 REM      MSB  LSB FORM IN DECIMAL.          EG
·80 REM :- - - - - - - - - - - - - - - -        KN
·90 PTR=FNPTR(M)                                NE
·100 F$="M = [4"#"][3" "][M] = [4"#"] = $
 [4"#"] = [3"#"]  [3"#"]"                       GL
·110 PRINT USING F$;M,PTR,HEX$(PTR),FNHI(
 PTR),FNLO(PTR)                                 DE
·120 RETURN                                     IM
```

SCREENS

FROM PAGE 82

SCREENS DATA A

```
·1       REM *** SCREENS ***                    HK
·5 REM PERMANENT ML BEGINS AT 828               MK
·10 PRINT"ENTERING MACHINE LANGUAGE"            NB
·15 POKE52,147:POKE56,147:CLR:B=37691           OI
·20 FORK=.TO195                                 AM
·25 FORJ=.TO15:READA:POKEB+J,A:X=X+A:NEXT
 :READA                                         PL
·30 IFX<>ATHENPRINT"ERROR IN DATA LINE"PE
 EK(64)*256+PEEK(63):STOP                       BD
·35 X=.:B=B+16:NEXT:POKE40827,3                 BA
·40 PRINT"MACHINE LANGUAGE ENTERED"             HO
·45 :                                           DI
·100      REM *** SAVE ML ***                   DN
·105 PRINT"SAVING SCREENS A"                    DG
·110 POKE780,8:POKE781,8:POKE782,255:SYS6
 5466                                           PM
·115 N$="0:SCREENS A,P,W"                       BJ
·120 L=LEN(N$):FORJ=1TOL:POKE849+J,ASC(MI
 D$(N$,J,1)):NEXT                               KE
·125 POKE780,L:POKE781,82:POKE782,3:SYS65
 469                                            HF
·130 POKE251,59:POKE252,147                     CE
·135 POKE780,251:POKE781,124:POKE782,159:
 SYS65496                                       CB
·140 IFSTTHENGOTO200                            AH
·145 PRINT"SCREENS A SAVED.  SYS37742 TO
 START                                          JF
·150 PRINT"INTERRUPT OR LOAD AND RUN SCRE
 ENS A.":STOP                                   AK
·155 :                                          DI
·195      REM *** READ ERROR CHANNEL ***        HA
·200 OPEN15,8,15                                AM
·205 INPUT#15,A,A$,B,C                          NG
·210 PRINTA,A$,B,C                              GA
·215 CLOSE15:STOP                               NG
·995 :                                          DI
·1000 DATA11,8,10,0,158,50,48,54,49,0,0,0
 ,169,13,133,87,790                             BP
·1002 DATA169,8,133,88,160,71,132,89,160,
 0,169,147,133,90,162,13,1724                   KN
·1004 DATA177,87,145,89,136,208,249,230,8
 8,230,90,202,48,2,208,240,2429                 JB
·1006 DATA76,110,147,162,111,189,144,147,
 157,62,3,202,16,247,169,147,2089               BL
·1008 DATA32,210,255,24,162,9,160,10,32,2
 40,255,169,164,160,148,32,2062                 II
·1010 DATA30,171,76,184,148,165,197,201,5
 7,240,3,108,60,3,120,169,1932                  GB
·1012 DATA49,141,20,3,169,234,141,21,3,88
 ,169,160,133,88,169,145,1733                   AP
·1014 DATA133,90,169,176,133,92,169,148,1
 33,94,160,0,132,87,132,89,1937                 NP
·1016 DATA132,91,132,93,32,157,3,120,169,
 46,133,1,162,12,177,91,1551                    LF
·1018 DATA145,93,136,208,249,230,92,230,9
 4,202,208,242,169,47,133,1,2479                HM
·1020 DATA88,76,93,158,120,169,46,133,1,3
 2,157,3,169,47,133,1,1426                      GG
·1022 DATA88,108,60,3,162,15,177,89,145,8
 7,136,208,249,230,88,230,2075                  ME
·1024 DATA90,202,208,242,96,169,128,141,1
 38,2,169,0,133,89,165,209,2181                 OB
·1026 DATA133,87,24,165,210,105,212,133,8
 8,164,211,177,209,72,170,177,2337              IG
·1028 DATA87,133,91,173,134,2,145,87,24,1
 77,209,105,128,145,209,230,2079                KF
·1030 DATA89,24,165,162,105,20,133,90,32,
 228,255,208,21,165,90,197,1984                 JF
·1032 DATA162,208,245,165,89,240,220,138,
 145,209,165,91,145,87,198,89,2596              EH
·1034 DATA240,223,170,104,164,211,145,209
 ,165,91,145,87,96,32,0,148,2230                BJ
```

```
•1036 DATA138,201,133,144,5,201,141,176,1
 ,96,32,210,255,208,238,169,2348          KH
•1038 DATA63,133,87,133,91,169,0,133,89,1
 33,93,169,5,133,88,169,1688              CO
•1040 DATA147,133,90,169,217,133,92,169,1
 46,133,94,160,240,165,2,240,2330         OA
•1042 DATA12,177,87,145,89,177,91,145,93,
 136,208,245,96,177,89,145,2112           II
•1044 DATA87,177,93,145,91,136,208,245,96
 ,80,82,69,83,83,32,95,1802               DO
•1046 DATA32,70,79,82,32,83,67,82,69,69,7
 8,83,0,173,20,3,1022                     LG
•1048 DATA141,60,3,173,21,3,141,61,3,120,
 169,62,141,20,3,169,1290                 HA
•1050 DATA3,141,21,3,88,32,16,158,162,12,
 177,91,145,93,136,208,1486               IC
•1052 DATA249,230,92,230,94,202,208,242,9
 6,0,0,0,0,0,0,169,1812                   CH
•1054 DATA15,141,34,208,133,2,32,106,148,
 173,17,208,9,64,141,17,1448              OE
•1056 DATA208,169,11,141,134,2,169,63,133
 ,87,169,5,133,88,160,240,1912            OO
•1058 DATA169,96,145,87,136,208,251,162,4
 0,169,109,157,63,5,157,7,1961            MA
•1060 DATA6,169,0,157,63,217,157,7,218,20
 2,208,237,162,24,181,217,2225            KI
•1062 DATA9,128,149,217,202,208,247,169,3
 9,133,213,96,0,198,201,204,2413          DO
•1064 DATA197,206,193,205,197,160,168,177
 ,173,177,180,160,195,200,193,210,2991    HA
•1066 DATA211,169,186,160,0,206,193,205,1
 97,160,212,207,207,160,204,207,2884      IH
•1068 DATA206,199,186,160,210,197,196,207
 ,0,48,58,72,32,44,83,44,1942             LO
•1070 DATA87,157,160,157,162,3,189,107,14
 9,32,210,255,202,208,247,96,2421         AH
•1072 DATA169,11,141,36,208,32,234,148,24
 ,162,10,160,2,32,240,255,1864            PG
•1074 DATA169,56,160,149,32,30,171,160,0,
 185,100,149,153,233,7,200,1954           KN
•1076 DATA192,4,208,245,132,95,32,0,148,1
 64,95,138,201,13,240,38,1945             OP
•1078 DATA201,20,208,12,192,4,240,238,136
 ,198,95,32,111,149,208,230,2274          ON
•1080 DATA41,127,201,32,144,224,138,153,2
 33,7,200,230,95,9,128,32,1994            NG
•1082 DATA210,255,208,210,240,208,192,19,
 144,25,32,111,149,136,208,250,2597       BN
•1084 DATA32,111,149,162,12,160,9,32,240,
 255,160,149,169,80,32,30,1782            DH
•1086 DATA171,240,149,162,0,189,104,149,1
 53,233,7,200,230,95,232,224,2538         EB
•1088 DATA4,208,242,96,165,92,32,210,255,
 165,91,32,210,255,165,90,2312            PC
•1090 DATA32,210,255,96,198,177,189,211,1
 95,210,197,197,206,160,195,207,2935      HG
•1092 DATA204,207,210,160,160,160,198,178
 ,189,211,193,214,197,13,29,29,2552       PH
•1094 DATA29,198,179,189,194,207,210,196,
 197,210,160,195,207,204,207,210,2992     AL
•1096 DATA160,160,160,198,180,189,212,200
 ,201,211,160,205,197,206,213,13,2865     JO
•1098 DATA29,29,29,198,181,189,208,210,20
 1,206,212,160,195,207,204,207,2665       LA
•1100 DATA210,160,160,160,160,198,182,189
 ,211,212,193,210,212,13,29,29,2528       OC
•1102 DATA29,198,183,189,197,210,193,211,
 197,160,205,197,206,213,160,160,2908     JJ
•1104 DATA160,160,160,198,184,189,211,193
 ,214,197,175,210,197,208,204,193,3053    EF
•1106 DATA195,197,19,0,0,15,111,8,232,7,2
 38,134,2,173,134,2,1467                  CD
•1108 DATA41,15,141,134,2,162,0,157,0,216
 ,157,0,217,157,0,218,1617                BD
•1110 DATA202,208,244,162,233,157,255,218
 ,202,208,250,96,32,234,148,24,2873       OH
•1112 DATA162,9,160,3,32,240,255,169,15,1
 60,150,32,30,171,169,0,1757              LL
•1114 DATA133,198,96,169,15,162,8,160,15,
 32,186,255,169,0,32,189,1819             JC
•1116 DATA255,32,192,255,162,15,96,198,17
 9,189,210,197,208,197,193,212,2790       NK
•1118 DATA160,160,160,198,181,189,211,212
 ,193,210,212,0,0,32,206,150,2474         LB
•1120 DATA32,198,255,160,0,132,5,169,126,
 133,78,169,145,133,79,32,1846            MC
•1122 DATA207,255,145,78,200,32,183,255,4
 1,64,240,243,160,0,177,78,2358           JL
•1124 DATA201,48,208,1,96,201,54,208,20,2
 00,177,78,201,51,208,13,1965             OH
•1126 DATA165,6,208,9,32,100,157,32,206,1
 50,76,111,151,230,5,32,1670              IF
•1128 DATA234,148,24,162,9,160,3,32,240,2
 55,160,0,177,78,201,13,1896              ID
•1130 DATA240,8,9,128,32,210,255,200,208,
 242,32,210,255,24,162,11,2226            EI
•1132 DATA160,10,32,240,255,160,150,169,2
 26,32,30,171,169,15,32,195,2046          KN
•1134 DATA255,76,231,255,165,95,162,233,1
 60,7,32,189,255,169,8,162,2454           GM
•1136 DATA8,164,38,32,186,255,32,192,255,
 96,0,70,53,32,84,79,1576                 GL
•1138 DATA32,83,76,79,87,32,32,32,32,70,5
 5,32,84,79,32,72,909                     KI
•1140 DATA65,76,84,32,76,73,83,84,73,78,7
 1,0,32,183,150,133,1293                  FH
•1142 DATA6,133,3,164,3,240,5,32,88,148,2
 08,5,32,228,255,240,1790                 GC
•1144 DATA251,201,133,144,238,208,14,238,
 33,208,173,33,208,41,15,141,2279         NE
•1146 DATA33,208,76,174,151,201,134,208,1
 4,238,32,208,173,32,208,41,2131          JA
•1148 DATA15,141,32,208,76,174,151,201,13
 6,144,27,208,31,165,3,208,1920           IC
•1150 DATA194,169,0,133,198,133,2,173,17,
 208,41,191,141,17,208,32,1857            II
```

```
·1152 DATA106,148,230,3,208,173,32,149,15
0,76,174,151,201,138,144,8,2091       OO
·1154 DATA208,10,165,3,240,166,208,148,23
0,6,208,6,201,140,144,71,2154         ML
·1156 DATA208,145,165,3,133,2,32,106,148,
165,6,208,13,165,4,240,1743           AC
·1158 DATA9,162,2,164,95,32,240,149,240,3
,32,123,149,169,0,133,1702            GK
·1160 DATA2,32,106,148,169,2,133,38,32,20
6,150,32,111,151,162,15,1489          AA
·1162 DATA32,251,150,165,5,240,17,165,197
,201,5,208,6,32,186,150,2010          IM
·1164 DATA76,170,151,201,6,208,240,96,162
,8,32,201,255,173,33,208,2220         PH
·1166 DATA32,210,255,173,32,208,32,210,25
5,173,24,208,32,210,255,160,2469      FL
·1168 DATA0,132,87,169,4,133,88,162,3,177
,87,32,210,255,136,208,1883           BI
·1170 DATA248,230,88,202,16,243,169,216,1
33,88,177,87,41,15,133,90,2176        CH
·1172 DATA162,3,132,91,132,92,177,87,41,1
5,197,90,240,13,72,32,1576            CE
·1174 DATA255,149,104,133,90,169,0,133,91
,133,92,230,91,208,2,230,2110         LF
·1176 DATA92,136,208,226,230,88,202,16,22
1,32,255,149,162,15,32,251,2315       OK
·1178 DATA150,165,5,240,3,76,79,152,133,4
,169,15,32,195,255,76,1749            GP
·1180 DATA231,255,211,195,210,197,197,206
,160,196,197,204,197,212,197,196,3261 MO
·1182 DATA0,24,165,162,101,90,133,90,165,
90,197,162,208,250,96,165,2098        EL
·1184 DATA92,201,15,176,16,169,13,32,210,
255,160,11,169,32,32,210,1793         GK
·1186 DATA255,136,208,250,96,169,208,133,
87,169,4,133,88,133,90,169,2328       EM
·1188 DATA248,133,89,162,15,160,25,177,89
,145,87,136,208,249,24,169,2116       DL
·1190 DATA40,101,87,133,87,144,3,230,88,2
4,169,40,101,89,133,89,1558           BE
·1192 DATA144,2,230,90,202,208,222,162,19
,160,11,76,240,255,169,1,2191         IL
·1194 DATA141,32,208,169,15,141,33,208,16
9,11,141,134,2,169,2,133,1708         GJ
·1196 DATA95,169,36,141,233,7,169,48,141,
234,7,169,0,133,38,169,1789           IF
·1198 DATA147,32,210,255,162,3,160,3,32,2
40,255,169,134,160,151,32,2145        CN
·1200 DATA30,171,32,111,151,169,8,32,195,
255,32,248,150,169,15,32,1800         CP
·1202 DATA195,255,32,231,255,165,5,240,11
,165,197,201,5,240,208,201,2606       HB
·1204 DATA6,208,246,96,32,111,151,162,8,3
2,198,255,162,5,160,11,1843           KB
·1206 DATA32,240,255,160,0,132,91,132,92,
32,207,255,201,0,240,14,2083          MO
·1208 DATA201,32,144,245,201,128,176,241,
153,126,145,200,208,235,165,91,2691   JL
·1210 DATA201,2,144,60,162,19,189,126,145
,201,83,208,51,173,127,145,2036       GI
·1212 DATA201,72,208,44,173,128,145,201,3
2,208,37,162,0,189,126,145,2071       JE
·1214 DATA32,210,255,232,224,18,208,245,2
30,92,32,250,152,165,197,201,2743     OG
·1216 DATA6,208,9,169,40,133,90,32,236,15
2,240,4,201,3,240,9,1772              KB
·1218 DATA230,91,32,183,255,41,64,240,8,1
69,8,32,195,255,76,248,2127           KK
·1220 DATA150,32,207,255,201,34,208,234,1
60,0,76,187,153,0,13,32,1942          OP
·1222 DATA32,67,82,83,82,95,61,72,73,76,7
3,84,69,32,68,79,1128                 PJ
·1224 DATA87,78,32,32,32,32,67,82,83,82,9
4,61,72,73,76,73,1056                 IL
·1226 DATA84,69,32,85,80,13,32,32,82,69,8
4,85,82,78,61,76,1044                 AA
·1228 DATA79,65,68,32,83,67,82,69,69,78,3
2,32,32,68,61,68,985                  LJ
·1230 DATA69,76,69,84,69,32,70,73,76,69,0
,78,79,32,72,32,980                   BL
·1232 DATA83,67,82,69,69,78,83,32,79,78,3
2,68,73,83,75,0,1051                  LB
·1234 DATA160,22,177,87,41,127,145,87,136
,208,247,96,198,177,189,193,2290      AI
·1236 DATA205,197,206,196,160,211,195,210
,197,197,206,160,160,160,160,198,3018 OK
·1238 DATA178,189,197,216,201,212,160,208
,210,207,199,210,193,205,13,160,2958  EM
·1240 DATA160,160,198,179,189,193,206,207
,212,200,197,210,160,211,195,210,3087 NG
·1242 DATA197,197,206,160,160,198,180,189
,212,200,201,211,160,205,197,206,3079 HO
·1244 DATA213,13,160,160,160,198,181,189,
212,207,160,211,212,193,210,212,2891  NK
·1246 DATA160,160,160,160,160,160,160,160
,198,183,189,197,210,193,211,197,2858 PK
·1248 DATA160,205,197,206,213,0,169,0,133
,4,32,73,153,169,15,32,1761           NM
·1250 DATA195,255,32,231,255,165,5,240,11
,165,197,201,5,240,235,201,2633       HH
·1252 DATA6,208,246,96,165,92,208,36,32,2
34,148,24,160,10,162,9,1836           JI
·1254 DATA32,240,255,169,118,160,154,32,3
0,171,24,160,10,162,11,32,1760        BA
·1256 DATA240,255,160,150,169,226,32,30,1
71,76,20,155,24,162,1,160,2031        CG
·1258 DATA10,32,240,255,169,226,160,150,3
2,30,171,169,41,160,154,32,2031       NF
·1260 DATA30,171,173,17,208,9,64,141,17,2
08,169,7,141,35,208,169,1767          HO
·1262 DATA14,197,92,176,2,133,92,198,92,1
69,0,133,94,133,89,169,1783           PB
·1264 DATA209,133,87,169,4,133,88,160,20,
177,87,9,128,145,87,136,1772          IJ
·1266 DATA208,247,169,10,133,90,32,236,15
2,165,197,201,7,208,24,165,2244       OH
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·1268 DATA94,201,0,240,244,198,94,32,139,
 154,56,165,87,233,40,133,2110              NH
·1270 DATA87,176,212,198,88,208,208,201,2
 ,208,24,165,94,197,92,240,2400             KP
·1272 DATA216,230,94,32,139,154,24,165,87
 ,105,40,133,87,144,184,230,2064            CL
·1274 DATA88,208,180,201,5,208,6,32,139,1
 54,76,1,155,201,6,208,1868                 GD
·1276 DATA3,76,139,154,201,18,208,4,230,8
 9,208,4,201,1,208,169,1913                 HM
·1278 DATA169,48,141,233,7,169,58,141,234
 ,7,160,3,162,2,177,87,1798                 PH
·1280 DATA41,127,201,64,176,8,201,32,176,
 19,9,64,208,15,201,96,1638                 HG
·1282 DATA176,4,9,128,208,7,201,160,176,3
 ,24,105,64,201,34,240,1740                 HL
·1284 DATA7,157,233,7,200,232,208,214,169
 ,44,157,233,7,169,83,232,2352              NC
·1286 DATA157,233,7,232,134,95,32,139,154
 ,165,89,240,24,32,100,157,1990             HH
·1288 DATA32,234,148,24,160,13,162,9,32,2
 40,255,169,221,160,152,32,2043             EO
·1290 DATA30,171,76,53,155,169,0,133,38,3
 2,111,151,169,8,32,195,1523                MG
·1292 DATA255,32,248,150,165,5,240,3,76,2
 0,155,169,147,32,210,255,2162              EL
·1294 DATA32,111,151,162,8,32,198,255,32,
 207,255,141,33,208,32,207,2064             CG
·1296 DATA255,141,32,208,32,207,255,141,2
 4,208,169,0,133,87,168,169,2229            ND
·1298 DATA4,133,88,162,3,32,207,255,145,8
 7,136,208,248,230,88,202,2228              CO
·1300 DATA16,243,169,216,133,88,169,3,133
 ,93,160,0,32,207,255,133,2050              JE
·1302 DATA92,32,207,255,133,91,32,207,255
 ,133,90,145,87,136,208,6,2109              KI
·1304 DATA230,88,198,93,48,23,198,91,208,
 241,165,92,208,9,32,183,2107               LI
·1306 DATA255,41,64,240,215,208,6,165,90,
 198,92,16,218,162,15,32,2017               JL
·1308 DATA251,150,165,5,240,3,76,20,155,1
 69,15,32,195,255,32,231,1994               HG
·1310 DATA255,169,7,32,236,148,24,162,9,1
 60,3,32,240,255,169,151,2052               JH
·1312 DATA160,154,32,30,171,169,0,133,198
 ,133,3,32,228,255,240,251,2189             GD
·1314 DATA201,133,208,23,169,15,141,34,20
 8,32,244,148,32,186,150,230,2154           AL
·1316 DATA4,169,0,133,2,32,106,148,76,167
 ,151,201,134,208,13,169,1713               LN
·1318 DATA15,141,34,208,169,21,141,24,208
 ,76,1,155,201,137,208,3,1742               PG
·1320 DATA230,39,96,201,135,208,1,96,201,
 138,208,6,165,3,240,187,2154               CK
·1322 DATA208,159,201,136,208,181,173,17,
 208,41,191,141,17,208,169,0,2258           CO
·1324 DATA133,2,32,106,148,230,3,208,167,
 169,83,141,232,7,160,0,1821                FE
·1326 DATA185,232,7,201,44,240,3,200,208,
 246,132,183,162,4,189,144,2380             JE
·1328 DATA150,133,184,202,16,248,165,186,
 32,177,255,165,185,32,147,255,2532         JM
·1330 DATA160,0,185,232,7,32,168,255,200,
 196,183,144,245,32,174,255,2468            AK
·1332 DATA76,231,255,211,212,193,210,212,
 13,160,160,198,177,189,205,193,2895        MK
·1334 DATA203,197,175,211,193,214,197,160
 ,211,195,210,197,197,206,160,160,3086      IN
·1336 DATA160,198,179,189,214,177,197,215
 ,160,211,195,210,197,197,206,13,2918       EK
·1338 DATA160,160,198,181,189,197,216,177
 ,212,160,208,210,207,199,210,193,3077      OE
·1340 DATA205,160,160,198,183,189,211,193
 ,214,197,160,208,210,207,199,160,3054      EG
·1342 DATA211,195,210,197,197,206,0,173,1
 36,2,133,88,160,0,132,87,2127              AD
·1344 DATA132,89,132,91,132,93,169,176,13
 3,90,169,216,133,92,169,180,2196           OP
·1346 DATA133,94,162,4,96,169,145,133,88,
 169,160,133,90,169,148,133,2026            OO
·1348 DATA92,169,176,133,94,160,0,132,87,
 132,89,132,91,132,93,162,1874              HM
·1350 DATA15,96,173,248,147,141,24,208,17
 3,247,147,141,134,2,32,242,2170            CN
·1352 DATA157,120,169,46,133,1,177,89,145
 ,87,177,93,145,91,136,208,1974             HE
·1354 DATA245,230,88,230,90,230,92,230,94
 ,202,208,234,169,47,133,1,2523             OD
·1356 DATA88,96,32,242,157,177,87,145,89,
 177,91,145,93,136,208,245,2208             EB
·1358 DATA230,88,230,90,230,92,230,94,202
 ,208,234,162,25,181,217,157,2670           BO
·1360 DATA177,145,202,16,248,162,125,181,
 0,157,0,145,202,16,248,173,2197            BL
·1362 DATA17,208,141,250,147,173,136,2,14
 1,249,147,173,24,208,141,248,2405          MG
·1364 DATA147,173,134,2,141,247,147,162,4
 ,189,32,208,157,251,147,202,2343           EH
·1366 DATA16,247,56,32,240,255,140,246,14
 7,142,245,147,169,4,141,136,2363           ML
·1368 DATA2,169,27,141,17,208,32,129,255,
 169,21,141,24,208,169,1,1713               GI
·1370 DATA141,32,208,169,7,141,33,208,169
 ,3,32,236,148,24,162,9,1722                PI
·1372 DATA160,17,32,240,255,169,158,160,1
 57,32,30,171,169,0,133,198,2081            BP
·1374 DATA32,228,255,240,251,201,133,208,
 11,169,147,32,210,255,32,167,2571          MI
·1376 DATA151,76,193,158,201,134,208,19,1
 69,15,141,34,208,169,0,133,2009            MN
·1378 DATA39,32,1,155,165,39,208,40,76,19
 3,158,201,135,240,33,201,1916              EC
·1380 DATA136,208,201,173,251,147,141,32,
 208,173,252,147,141,33,208,32,2483         PM
·1382 DATA45,158,169,0,133,39,32,236,156,
 165,39,208,3,76,193,158,1810               IH
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IMPORTANT! Letters on white background are **Bug Repellent** line codes. **Do not enter them!** Pages 109 and 110 explain these codes and provide other essential information on entering ***Ahoy!*** programs. Refer to these pages **before** entering any programs!

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·1384 DATA162,4,189,251,147,157,32,208,20
2,16,247,173,250,147,141,17,2343          AL
·1386 DATA208,162,125,189,0,145,149,0,202
,16,248,32,45,158,173,249,2101            NF
·1388 DATA147,141,136,2,162,25,189,177,14
5,149,217,202,16,248,24,172,2152          FO
·1390 DATA246,147,174,245,147,32,240,255,
32,196,148,32,16,158,76,141,2285          DA
·1392 DATA3,3                             BO
```

SCREENS DATA B

```
·5      REM *** SCREENS DATA B ***        CH
·10 REM LOAD AND RUN SCREENS DATA A FIRST
.  PERMANENT ML BEGINS AT 40845           NE
·100 A=159:FORK=1TO3:X=.                  ML
·105 FORJ=1TO3:READB:READC:READD:X=X+B+C+
D:POKEC,B:POKED,A:NEXT                    PO
·110 READE:IFX<>ETHENPRINT"ERROR IN DATA
LINE"PEEK(64)*256+PEEK(63)                PA
·115 X=.:NEXT                             PG
·150 DATA143,37748,37749,141,37783,37784,
238,37824,37825,227235                    ND
·155 DATA238,37861,37862,141,37869,37870,
141,38076,38077,228135                    GG
·160 DATA142,38082,38083,143,38086,38091,
222,40826,40827,234502                    KJ
·165 :                                    DI
·595 REM *** SAVE SCREENS B ***           FI
·600 PRINT"SAVING SCREENS B"              DF
·605 POKE780,8:POKE781,8:POKE782,255:SYS6
5466                                      PM
·610 N$="0:SCREENS B,P,W"                 DC
·615 L=LEN(N$):FORJ=1TOL:POKE849+J,ASC(MI
D$(N$,J,1)):NEXT                          KE
·620 POKE780,L:POKE781,82:POKE782,3:SYS65
469                                       HF
·635 POKE251,59:POKE252,147               CE
·645 POKE780,251:POKE781,124:POKE782,159:
SYS65496                                  CB
·650 IFSTTHENGOTO700                      AM
·655 PRINT"SCREENS B SAVED":STOP          JO
·660 :                                    DI
·695 REM *** READ ERROR CHANNEL ***       HF
·700 OPEN15,8,15                          AM
·705 INPUT#15,A,A$,B,C                    NG
·710 PRINTA,A$,B,C                        GA
·715 CLOSE15:STOP                         NG
```

SCREENS DATA C

```
·5      REM *** SCREENS DATA C ***        CE
·10 REM LOAD AND RUN SCREENS DATA A FIRST
: PERMANENT ML BEGINS AT 53133            IK
·100 A=207:FORK=1TO3:X=.                  LL
·105 FORJ=1TO3:READB:READC:READD:X=X+B+C+
D:POKEC,B:POKED,A:NEXT                    PO
·110 READE:IFX<>ETHENPRINT"ERROR IN DATA
LINE"PEEK(64)*256+PEEK(63)                PA
·115 X=.:NEXT                             PG
·150 DATA143,37748,37749,141,37783,37784,
238,37824,37825,227235                    ND
·155 DATA238,37861,37862,141,37869,37870,
141,38076,38077,228135                    GG
·160 DATA142,38082,38083,143,38086,38091,
222,40826,40827,234502                    KJ
·590 :                                    DI
·595 REM *** SAVE ML ***                  DN
·600 PRINT"SAVING SCREENS C"              CI
·605 POKE780,8:POKE781,8:POKE782,255:SYS6
5466                                      PM
·610 N$="0:SCREENS C,P,W"                 DH
·615 L=LEN(N$):FORJ=1TOL:POKE849+J,ASC(MI
D$(N$,J,1)):NEXT                          KE
·620 POKE780,L:POKE781,82:POKE782,3:SYS65
469                                       HF
·635 POKE251,59:POKE252,147               CE
·645 POKE780,251:POKE781,124:POKE782,159:
SYS65496                                  CB
·650 IFSTTHENGOTO700                      AM
·655 PRINT"SCREENS C SAVED":STOP          LL
·660 :                                    DI
·695 REM *** READ ERROR CHANNEL ***       HF
·700 OPEN15,8,15                          AM
·705 INPUT#15,A,A$,B,C                    NG
·710 PRINTA,A$,B,C                        GA
·715 CLOSE15:STOP                         NG
```

STARFIGHTER
FROM PAGE 25

```
·10 POKE53280,00:POKE53281,00:GOSUB1200:G
OSUB4000                                  FL
·20 FORI=0TO5:HI$(I)="":NEXTI             FK
·30 X=254:Y=222:V=53248                   LL
·40 POKE2040,251:POKE2041,252:FORI=2042TO
2047:POKEI,253:NEXTI                      CA
·50 POKEV,X:POKEV+16,0:POKEV+1,255        KD
·60 POKEV+28,255:POKEV+27,0:POKEV+23,0:PO
KEV+29,0:POKEV+40,1:POKEV+38,14           EK
·70 POKEV+39,12:POKEV+37,0:POKEV+21,253:F
ORI=V+41TOV+46:POKEI,02:NEXTI             GM
·80 FORI=V+4TOV+14STEP2:POKEI,0:NEXTI     AJ
·90 FORI=V+5TOV+15STEP2:POKEI,(I-V-5)*19.
9:NEXTI                                   CE
·100 POKE54280,8:POKE54279,0:POKE54282,0:
POKE54281,0:POKE54284,25:POKE54285,0      CN
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·130 PRINT"[CLEAR]";:SYS49321:GOSUB1300:P
 OKEV+1,Y                                  EA
·140 POKE54296,15:POKE54277,9:POKE54278,0 KM
·145 POKE54273,16:POKE54272,0             HI
·180 SYS49152:I=PEEK(53278):POKE251,0     OM
·190 SYS49374:SYS65418                    GN
·195 FORI=0TO15:POKEV+I,0:NEXTI           GP
·200 SC$=""                               LC
·210 FORI=1176TO1182:SC$=SC$+CHR$(PEEK(I)
 ):NEXT                                   CB
·220 POKE53269,0:PRINT"[CLEAR][DOWN][DOWN
 ]"CHR$(142)CHR$(8):GOSUB3000             EA
·221 SR=VAL(SC$):BN=INT(SR/10):GT=SR+BN   GA
·230 PRINT"[DOWN][DOWN]"TAB(15)"[WHITE]SC
 ORE "GT                                  JE
·235 PRINT"[DOWN]"TAB(15)"[BLUE]BONUS="BN OI
·240 FORI=0TO4                            JC
·250 IFSC$<HI$(I)THEN300                  GG
·260 FORJ=5TOI+1STEP-1                    CI
·270 HI$(J)=HI$(J-1)                      FB
·280 NEXTJ                                MM
·290 HI$(I)=SC$:I=4                       BE
·300 NEXTI                                MN
·310 PRINT"[DOWN]"TAB(15)"[YELLOW]HIGH SC
 ORES[DOWN]"                              BK
·320 FORI=0TO4                            JC
·325 KK=VAL(HI$(I))+BN                    OO
·327 IF KK=BNTHENBN=0:KK=0                DH
·330 PRINTTAB(14)I+1KK                    IE
·340 NEXTI                                MN
·350 PRINT"[PURPLE]"                      HM
·460 PRINT"[DOWN]"TAB(10)"[PRESS [RED][RV
 SON]FIRE[RVSOFF][PURPLE] TO PLAY]"       HF
·465 FORCC=55951TO55959:POKECC,02:NEXTCC  PC
·470 IF(PEEK(56320)AND16)<>0THEN470       JP
·480 GOTO30                               OJ
·500 POKE56334,0:POKE1,51                 KE
·510 OF=53248-12288                       PD
·520 FORI=12288TO12288+250*8-1            GN
·530 POKEI,PEEK(I+OF)                     KJ
·540 NEXTI                                MN
·550 POKE1,55:POKE56334,1                 ID
·560 FORI=12288+250*8TO12288+256*8-1:POKE
 I,0:NEXTI                                BI
·570 POKE12288+253*8,8                    DM
·580 POKE53272,29                         DF
·590 RETURN                               IM
·900 I=251*64                             LI
·910 READA:IFA=-1THEN5000                 OM
·920 POKEI,A:I=I+1:GOTO910                DK
·999 REM********************************* DD
·1000 DATA0,32,0,0,32,0,0,32,0            GE
·1001 DATA0,32,0,0,152,0,0,152,0          IH
·1002 DATA0,152,0,0,152,0,0,168,0         IH
·1003 DATA2,170,0,130,170,8,138,170,136   NH
·1004 DATA41,169,160,166,170,104,154,170,
 152                                      BC
·1005 DATA160,168,40,0,168,0,0,168,0      GK
·1006 DATA2,170,0,10,170,128,10,34,128,0  NB
·1007 DATA0,32,0,0,32,0,0,32,0            GE
·1008 DATA0,32,0,0,32,0,0,32,0            GE
·1009 DATA0,32,0,0,32,0,0,0,0             NK
·1010 DATA0,0,0,0,0,0,0,0,0               JH
·1011 DATA0,0,0,0,0,0,0,0,0               JH
·1012 DATA0,0,0,0,0,0,0,0,0               JH
·1013 DATA0,0,0,0,0,0,0,0,0,0             NC
·1014 DATA8,0,128,10,154,128,2,154,0      LH
·1015 DATA0,152,0,0,152,0,2,170,0         MM
·1016 DATA1,169,0,9,169,128,41,169,160    MO
·1017 DATA169,169,168,160,168,40,128,152,
 8                                        OD
·1018 DATA128,152,8,0,152,0,0,152,0       HE
·1019 DATA0,48,0,0,48,0,0,48,0            JD
·1020 DATA0,48,0,0,48,0,0,48,0,0          NK
·1021 DATA0,0,0,0,0,0,0,32,0              LL
·1022 DATA0,8,0,0,0,0,0,2,0               MB
·1023 DATA0,128,0,8,0,0,0,8,0             GL
·1024 DATA2,32,128,0,8,0,0,32,32          CM
·1025 DATA0,130,0,8,0,0,0,0,128           CG
·1026 DATA0,32,0,0,0,0,2,2,0              PH
·1027 DATA0,32,0,0,0,0,0,0,0,0            BG
·1028 DATA0,128,0,0,0,128,0,32,0          BD
·1029 DATA8,0,8,0,0,0,0,128,2             FB
·1030 DATA130,0,0,0,160,32,0,136,0        EP
·1031 DATA32,136,2,2,138,0,128,8,136      IE
·1032 DATA32,128,2,0,32,0,32,32,32        MN
·1033 DATA0,0,32,8,0,0,0,2,0              JP
·1034 DATA0,128,0,0,0,32,0,8,0,-1         AE
·1200 PRINT"[CLEAR][6"[DOWN]"]"CHR$(142)C
 HR$(8):GOSUB3000                         MN
·1210 PRINT"[DOWN][DOWN]"TAB(13)"[PURPLE]
 BY MICHAEL J. CARSTON"                   JG
·1215 PRINT"[DOWN]"TAB(18)"[BLUE]ONE MOME
 NT PLEASE[3"."]"                         JJ
·1220 GOSUB900:RETURN                     PI
·1300 PRINT"[RED]";:FORI=0TO20:PRINTSPC(2
 8)"[RVSON][c K][11" "][RVSOFF]";:NEXTI   GN
·1302 PRINTSPC(32)"[c *][RVSON][7" "][RVS
 OFF]";                                   MF
·1305 FORI=22TO23:PRINTSPC(33)"[RVSON][7"
 "][RVSOFF]";:NEXTI                       DB
·1310 PRINTSPC(32)"[RVSON][sEP][6" "][RVS
 OFF]";                                   GG
·1320 POKE56295,2:POKE2023,160            GH
·1330 PRINT"[HOME][DOWN][DOWN][c 7]"TAB(3
 1)"[c K] SCORE [RVSON][c K][RVSOFF]"TAB(
 71)"[c K][7"0"][RVSON][c K][RVSOFF]"     CD
·1340 PRINT"[DOWN][DOWN]"TAB(31)"[c K] SH
 IPS [RVSON][c K][RVSOFF]"TAB(71)"[c K][3
 " "]2[3" "][RVSON][c K][RVSOFF]"         JL
·1380 RETURN                              IM
·3000 PRINT"[RED][5" "]S[5" "][YELLOW]T[5
 " "][c 7]A[5" "][GREEN]R"                JE
·3005 PRINT"[c 7][3" "][c R][3"[s C]"][c
 S]"                                      JA
·3010 PRINT"[GREEN][3" "][s -][5" "][c R]
```

```
 [s U][s C][s C][s I] [c R]  [c R] [c A]
 [s C][c R][s C][c S] [c R][s C][s C][c S
 ] [c R][s *][s C][s I]"                   MH
•3020 PRINT"[RED][3" "][s -][5" "][s -] [
 s -][4" "][s -]  [s -][3" "][s -][3" "][
 s -][4" "][s -]  [s -]"                   FN
•3030 PRINT"[YELLOW][3" "][c Q][s C][s C]
 [3" "][s -] [s -] [s C][c R] [c Q][s C][
 s C][c W][3" "][s -][3" "][c Q][s C][s C
 ]  [c Q][s *][c R][s K]"                  ON
•3040 PRINT"[BLUE][3" "][s -][5" "][s -]
 [s -]  [s -] [s -]  [s -][3" "][s -][3"
 "][s -][4" "][s -] [s J][s I]"            CB
•3050 PRINT"[GREEN][3" "][s -][5" "][s -]
 [s -]  [s -] [s -]  [s -][3" "][s -][3"
 "][s -][4" "][s -]  [s -]"                NB
•3060 PRINT"[RED][3" "][c E][5" "][c E] [
 s J][s C][s C][s K] [c E]  [c E][3" "][c
 E][3" "][c E][s C][s C][c X] [c E]  [c
 E]"                                       NA
•3070 RETURN                               IM
•4000 FORI=16384TO17383:POKEI,32:NEXTI     NJ
•4005 GOSUB500                             CN
•4010 FORJ=16385TO16423STEP2               PC
•4015 I=INT(RND(1)*6)+250                  LA
•4020 FORK=0TO960STEP40                    BN
•4030 POKEJ+K,I:I=I+1:IFI=256THENI=250     DG
•4040 NEXTK,J                              EE
•4050 FORI=1TO250:POKE16384+INT(RND(1)*10
 00),32:NEXTI                              FH
•4060 RETURN                               IM
•5000 REM******************************    CE
•5010 READA:IFA>255THENI=A:GOTO5010        HO
•5020 IFA=-1THENRETURN                     JK
•5030 POKEI,A:I=I+1:GOTO5010               FK
•5040 REM******************************    CE
•5090 DATA49152,162,13,160,192,120,142,20
 ,3,140,21,3,88,96,160,255,185,0,55,153    JD
•6000 DATA1,55,136,192,207,208,245,173,0,
 56,141,208,55,160,2,173,0,220,41,4,208    BJ
•6010 DATA11,174,0,208,202,224,25,144,3,1
 42,0,208,173,0,220,41,8,208,11,174,0      CG
•6020 DATA208,232,224,254,176,3,142,0,208
 ,162,0,254,5,208,232,232,224,12,208       NE
•6030 DATA247,136,208,206,165,251,208,9,1
 65,162,41,1,208,3,76,49,234               BB
•6040 DATA162,0,173,0,208,201,230,176      OA
•6050 DATA46,189,4,208,201,25,144,33,189,
 4,208,201,230,176,26,189,4,208,105,20     LG
•6060 DATA205,0,208,176,3,254,4,208,189,4
 ,208,233,20,205,0,208,144,3,222,4,208     FJ
•6070 DATA232,232,224,12,208,210           NE
•6080 DATA234,234,234,162,0,254,5,208,232
 ,232,224,12,208,247,76,49,234             KG
•6085 REM******************************    CE
•6090 DATA169,1,162,0,157,0,216,157,250,2
 16,157,244,217,157,238,218                PG
•6100 DATA232,224,250,208,239,162,0,189,0
 ,64,157,0,4,189,250,64,157,250,4          GH
•6110 DATA189,244,65,157,244,5,189,238,66
 ,157,238,6,232,224,250,208,227,96         JB
•6130 REM******************************    CE
•6140 DATA173,139,5,201,47,208,1,96,32,13
 3,193,162,0,189,5,208,201,30,176          JO
•6150 DATA18,169,128,109,18,208,42,42,201
 ,25,144,7,201,230,176,3,157,4,208,232     EJ
•6160 DATA232,224,12,208,225,173,0,208,20
 1,240,176,62,173,0,220,41,16,208,55       IM
•6170 DATA174,0,208,142,2,208,160,210,140
 ,3,208,173,21,208,9,2,141,21              DH
•6180 DATA208,169,128,141,4,212,169,129,1
 41,4,212,162,224,206,3,208                BG
•6190 DATA32,133,193,202,208,253,172,3,20
 8,192,60,208,238                          KF
•6200 DATA173,21,208,41,253,141,21,208,76
 ,222,192                                  GD
•6210 REM******************************    CE
•6220 DATA169,128,141,11,212,169,129,141,
 11,212,162,151                            NG
•6230 DATA160,4,134,253,132,254,160,5,177
 ,253                                      IB
•6240 DATA170,232,224,58,208,19,162,48,13
 8,145,253,192,4,208,7,238,139,5           PP
•6250 DATA165,1,133,251,136,208,229,138,1
 45,253,96                                 EB
•6260 REM******************************    CE
•6270 DATA173,30,208,133,2,201,0,208,1,96
 ,32,82,193                                DN
•6280 DATA169,253,141,21,208,162,0,165,2,
 41,1,240,5,169,254,157,248,7,102,2        AG
•6290 DATA232,224,1,240,249,224,8,208,234
 ,160,32,162,0,202,208,253,136             DG
•6300 DATA208,248,162,0,189,248,7,201,254
 ,208,5,169,255,157,248,7                  CN
•6310 DATA232,224,1,240,251,224,8,208,235
 ,160,16,162,0,202,208,253,136             CG
•6320 DATA208,248,162,0,160,0,189,250,7,2
 01,255,208,5,169,0,153,4,208,200          LL
•6330 DATA200,232,224,6,208,237,173,248,7
 ,201,255,208,9,141,0,208                  DH
•6340 DATA206,0,208,206,139,5              EM
•6350 DATA162,0,160,251,189,248,7,201,255
 ,208,4,152,157,248,7,160,253,232,224,1    BA
•6360 DATA240,251,224,8,208,234,160,16,16
 2,0,202,208,253,136,208,248               BO
•6370 DATA160,60,140,3,208,173,30,208,96,
 -1                                        CN
```

Have the joints in your fingers begun to stiffen yet? If not, they surely will...you've got another 27 pages of program listings to go.

If your fingers had a will of their own, they'd flip to page 79, where you can find out how to receive all the programs in this magazine on disk.

IMPORTANT! Letters on white background are **Bug Repellent** line codes. **Do not enter them!** Pages 109 and 110 explain these codes and provide other essential information on entering ***Ahoy!*** programs. Refer to these pages **before** entering any programs!

HANGER 14
FROM PAGE 23

```
•1 PRINT"[CLEAR]                                FH
•2 POKE53282,15:POKE53283,1                     HA
•3 PRINT"[CLEAR][WHITE]"CHR$(8):POKE53280
 ,0:POKE53281,0:POKE53269,0                     KG
•4 PRINT"[CLEAR][RED][10"[DOWN]"][14"[RIG
 HT]"]HANGER 14                                 BE
•5 PRINT"[BLUE][DOWN][6" "]ONE MOMENT LOA
 DING DATA[3"."]":GOTO121                       NJ
•6 CD=1:HI=0000                                 LA
•7 GOSUB97                                      AE
•8 GOSUB91                                      PK
•9 GOSUB104:TI$="0                              DA
•10 X=0:POKEV,X:Y=123:POKEV+1,Y:POKEV+21,
 SP:FORX=1TO15:POKE2040,254:POKEV,X             AF
•11 POKE2040,255:NEXT:Z=PEEK(V+30):Z=PEEK
 (V+31)                                         NL
•12 IFJTHEN16                                   ON
•13 IFX>15AND(PEEK(56320)AND4)=0THENX=X-4       KE
•14 IF(PEEK(56320)AND8)=0THENX=X+4              KN
•15 IF(PEEK(56320)AND16)=0THENK=PEEK(5632
 0):J=1:POKE2040,255:GOSUB49                    AM
•16 IFX>250THEN54                               FH
•17 POKEV,X:POKEV+1,Y                           AP
•18 IFJTHENGOSUB49:GOTO22                       JF
•19 P=PEEK(56320):IFJ=0AND(PAND4)=4AND(PA
 ND8)=8THENPOKE2040,254:GOTO22                  OC
•20 IFA=1THENA=2:POKE2040,255:GOTO22            CN
•21 POKE2040,254:A=1                            LC
•22 ONLGOSUB25,26,27,28,29,30,31                BL
•23 IFHTHEN64                                   OE
•24 GOTO12                                      PF
•25 GOSUB32:RETURN                              MG
•26 GOSUB40:RETURN                              LJ
•27 GOSUB37:RETURN                              MD
•28 GOSUB43:GOSUB32:RETURN                      OO
•29 GOSUB32:GOSUB37:RETURN                      PN
•30 GOSUB37:GOSUB43:RETURN                      OP
•31 GOSUB46:GOSUB32:GOSUB37:RETURN              CI
•32 IFBTHEN34                                   NN
•33 B=1:C=255:POKEV+2,C:POKEV+3,122:GOSUB
 75:POKEV+21,SP+2                               CC
•34 C=C-7:IFC<0THENPOKEV+21,SP:B=0:C=255:
 POKEV+2,C:RETURN                               CG
•35 POKEV+2,C:IFPEEK(V+30)=3THENH=1:C=255
 :POKEV+21,SP                                   JL
•36 RETURN                                      IM
•37 PRINT"[HOME][6"[DOWN]"]"SPC(18)D$(D):
 D=D+DO:IFD=6ORD=0THENDO=-DO                    IA
•38 IFPEEK(V+31)=1THENH=1                       LJ
•39 RETURN                                      IM
•40 IFJTHENRETURN                               BB
•41 IF(X>87ANDX<106)OR(X>144ANDX<161)OR(X
 >196ANDX<219)THENH=1                           JA
•42 RETURN                                      IM
•43 IFJTHENRETURN                               BB
•44 IF(X>97ANDX<124)OR(X>170ANDX<196)THEN
 H=1                                            GL
•45 RETURN                                      IM
•46 IFJTHENRETURN                               BB
•47 IF(X>87ANDX<106)THENH=1                     HH
•48 RETURN                                      IM
•49 Y=Y-U:IFY<111THENU=-U                       NC
•50 IFY>123THENY=123:J=0:U=3:RETURN             CB
•51 IFX>15AND(KAND4)=0THENX=X-2.5:RETURN        GA
•52 IF(KAND8)=0THENX=X+2.5                      EF
•53 RETURN                                      IM
•54 PO=INT(1000-(TI/2)):IFL=7THEN88             JL
•55 POKEV+21,SP                                 MK
•56 FORI=1TO4:POKE2040,254:FORJ=123TO113S
 TEP-1:POKE2040,255:POKEV,255                   CB
•57 POKEV+1,J:NEXT:GOSUB76:FORJ=113TO123:
 POKEV,255:POKEV+1,J:NEXT:NEXT:X=X+255          MJ
•58 POKEV+16,5:FORI=1TO75:POKEV,I:POKEV+1
 ,123:POKE2040,255:POKE2040,254:NEXT            OI
•59 POKEV+21,0:POKEV+16,4                       PN
•60 PRINT"[CLEAR]":LE=LE+1:L=L+1:IFL>7THE
 NL=1                                           FE
•61 J=0:IFPO<0THENPO=0                          LP
•62 SC=SC+100+PO:IFSC/1000=(INT(SC/1000))
 THENLI=LI+1:GOSUB86                            EH
•63 FORI=1TO500:NEXT:GOTO9                      KE
•64 SO=155:POKEV+21,SP:POKE2040,255             JD
•65 POKEV+1,Y:Y=Y+3:IFY>255THEN68               FM
•66 POKES+4,32:POKES+5,10:POKES+6,1:POKES
 +4,129:SO=SO-2:POKES+1,SO:POKES,SO             LM
•67 GOTO65                                      PB
•68 LI=LI-1:IFLI<0THENPOKEV+21,12:GOTO70        IB
•69 H=0:J=0:GOSUB86:GOTO10                      PC
•70 G$="REVO  EMAG":FORI=1TO10                  MJ
•71 FORJ=1TO(24-I):PRINT"[HOME][WHITE][8"
 [DOWN]"]"TAB(J)" "MID$(G$,I,1);:NEXT:NEX
 T                                              JE
•72 FORI=1TO2000:NEXT:POKEV+21,0:PRINT"[C
 LEAR]":FORI=1TO500:NEXT                        LC
•73 IFSC>HITHENHI=SC                            OA
•74 GOTO7                                       MC
•75 POKES+4,128:POKES+5,12:POKES+6,10:POK
 ES+4,33:POKES+1,2:POKES,2:RETURN               GJ
•76 POKES+4,16:POKES+5,12:POKES+6,10:POKE
 S+4,33:POKES+1,05:POKES,200:RETURN             CN
•77 PRINT"[HOME][GREEN][20"[DOWN]"]";           AJ
•78 A$=MID$(STR$(SC),2,LEN(STR$(SC))):SC$
 =LEFT$("[6"0"]",7-LEN(STR$(SC)))               DI
•79 SC$=SC$+A$:PRINTSPC(7);SC$                  AE
•80 PRINT"[HOME][20"[DOWN]"]";                  NE
```

```
•81 A$=MID$(STR$(LE),2,LEN(STR$(LE))):LE$
=LEFT$("[3"0"]",4-LEN(STR$(LE)))          GB
•82 LE$=LE$+A$:PRINTSPC(22);LE$           JG
•83 PRINT"[HOME][20"[DOWN]"]";            NE
•84 A$=MID$(STR$(HI),2,LEN(STR$(HI))):HI$
=LEFT$("[6"0"]",7-LEN(STR$(HI)))          FG
•85 HI$=HI$+A$:PRINTSPC(34);HI$:RETURN    LM
•86 LI$="[s D] [s D] [s D]                MO
•87 PRINT"[HOME][GREEN][22"[DOWN]"]"LEFT$
(LI$,LI*2)"[14" "]":RETURN                GA
•88 POKEV+21,SP:POKEV+1,123:FORI=1TO5:FOR
X=20TO30STEP.5:POKEV+8,X:NEXT             DC
•89 GOSUB76:FORX=30TO20STEP-.5:POKEV+8,X:
NEXT:GOSUB76:NEXT:SC=SC+2000              FO
•90 POKEV+21,0:GOTO60                     HG
•91 TS=1:GOSUB104:POKEV+21,12:PRINT"[HOME
]"TAB(9)"[DOWN][WHITE][3" "]H A N G E R[
3" "]1 4                                  IF
•92 GOSUB77                               PK
•93 FORXL=1TO1000:NEXT                    EC
•94 PRINT"[HOME][DOWN][6" "]PRESS FIRE BU
TTON TO BEGIN                             DC
•95 IF(PEEK(56320)AND16)=0THENPOKEV+21,0:
PRINT"[CLEAR]":FORI=1TO500:NEXT:RETURN    FI
•96 GOTO95                                PK
•97 V=53248:X=0:Y=123:POKEV,X:POKEV+1,Y:L
=1:LE=1:SC=0:LI=2:A=1:DO=1:J=0:U=3        JF
•98 B=0:H=0:C=255:SP=13                   DL
•99 P$="[4" "][DOWN][4"[LEFT]"][4" "][DOW
N][4"[LEFT]"][4" "][UP]                   AN
•100 D$(1)="[s F][DOWN][LEFT] [DOWN][LEFT
] [DOWN][LEFT] [DOWN][LEFT] ":D$(2)="[s
E][DOWN][LEFT][s F][DOWN][LEFT] [DOWN][L
EFT] [DOWN][LEFT] ":D$(3)="[s E][DOWN][L
EFT][s E][DOWN][LEFT][s F][DOWN][LEFT] [
DOWN][LEFT]                               PN
•101 D$(4)="[s E][DOWN][LEFT][s E][DOWN][
LEFT][s E][DOWN][LEFT][s F][DOWN][LEFT]
":D$(5)="[s E][DOWN][LEFT][s E][DOWN][LE
FT][s E][DOWN][LEFT][s E][DOWN][LEFT][s
F]                                        AJ
•102 H$="[RED][9" "]H A N G E R[3" "]1 4  HN
•103 S=54272:FORI=STOS+23:POKEI,0:NEXT:PO
KES+24,15:RETURN                          NF
•104 W$="[c 4][s A][s B][s A][s B][s A][s
 B][s A][s B][s A][s B][s A][s B][s A][s
 B][s A][s B][s A][s B][s A][s B][s A][s
 B][s A][s B][s A][s B][s A][s B][s A][s
 B][s A][s B][s A][s B][s A][s B][s A][s
 B][s A][s B]                             FI
•105 W1$="[c 4][s B][s A][s B][s A][s B][
s A][s B][s A][s B][s A][s B][s A][s B][
s A][s B][s A][s B][s A][s B][s A][s B][
s A][s B][s A][s B][s A][s B][s A][s B][
s A][s B][s A][s B][s A][s B][s A][s B][
s A][s B][s A]                            BL
•106 PRINT"[CLEAR][3"[DOWN]"]"W$;W1$;W$"[
5"[DOWN]"]";W$;W1$;W$;W1$;W$;W1$;W$;W1$   BN
•107 PRINT"[HOME][15"[DOWN]"][RIGHT][7" "
][DOWN][7"[LEFT]"][7" "][DOWN][7"[LEFT]"
]                                         GP
•108 PRINT"[BLUE][DOWN]SCORE:[9" "]LEVEL:
[7" "]HSC:                                IO
•109 IFTS=1THENTS=0:RETURN                DM
•110 PRINT"[HOME]"TAB(9)"[DOWN][GREEN][3"
 "]H A N G E R[3" "]1 4                   OB
•111 CD=CD+1:POKE53282,CD                 DF
•112 ONLGOSUB113,114,115,116,117,118,119:
GOSUB77:GOSUB86:RETURN                    DF
•113 SP=13:RETURN                         HI
•114 PRINT"[HOME][11"[DOWN]"]"SPC(10)P$SP
C(3)P$SPC(3)P$:RETURN                     OD
•115 RETURN                               IM
•116 PRINT"[HOME][11"[DOWN]"]"SPC(12)P$SP
C(5)P$:RETURN                             NE
•117 RETURN                               IM
•118 PRINT"[HOME][11"[DOWN]"]"SPC(12)P$SP
C(5)P$:RETURN                             NE
•119 PRINT"[HOME][11"[DOWN]"]"SPC(10)P$:P
OKEV+16,20:SP=29:CD=2:RETURN              CP
•120 END                                  IC
•121 POKE52,48:POKE56,48:CLR:POKE56334,PE
EK(56334)AND254:POKE1,PEEK(1)AND251       CI
•122 FORI=0TO511:POKE12288+I,PEEK(I+53248
):NEXT:POKE1,PEEK(1)OR4                   CB
•123 POKE56334,PEEK(56334)OR1             PD
•124 POKE53272,(PEEK(53272)AND240)+12:POK
E53270,216                                JD
•125 FORI=0TO47:READQ:VU=VU+Q:POKE12808+I
,Q:NEXT:IFVU<>3518THENGOTO156             ED
•126 Q=0:FORI=255TO250STEP-1:FORJ=0TO62:R
EADQ:POKEI*64+J,Q:FV=FV+Q:NEXT:NEXT       DA
•127 IFFV<>17595THENGOTO157               FG
•128 V=53248:POKEV+4,25:POKEV+5,97:POKEV+
16,20:POKEV+40,5:POKEV+41,15              FM
•129 POKEV+42,2:POKEV+43,7:POKEV+6,36:POK
EV+7,172:POKEV+8,20:POKEV+9,117           DC
•130 POKEV+23,0:POKEV+29,9:POKE2040,255:P
OKE2041,253:POKE2042,252:POKE2043,251     AP
•131 POKE2044,250:GOTO6                   BG
•132 DATA170,149,149,149,149,149,149,128  JF
•133 DATA170,84,84,84,84,84,84,0          KG
•134 DATA0,0,0,0,0,0,0,0                  FG
•135 DATA16,56,16,120,88,72,120,48        LF
•136 DATA66,66,66,66,66,66,66,66          EO
•137 DATA66,66,66,66,66,66,66,126         HM
•138 DATA0,20,0,0,30,0,0,56,0,0,56,0,0,30
,0,0,12,0,0,30,0,0,55,0,0,119,0,0,115     NJ
•139 DATA0,0,62,0,0,4,0,0,10,0,0,4,0,0,0,
0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0       AG
•140 DATA0,0                              BC
•141 DATA0,10,0,0,30,0,0,56,0,0,56,0,0,30
,0,0,12,0,0,30,0,0,55,0,0,111,0,0,119     HM
•142 DATA0,0,62,0,0,8,0,0,20,0,0,8,0,0,0,
0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0       AA
•143 DATA0                                LH
```

IMPORTANT! Letters on white background are **Bug Repellent** line codes. **Do not enter them!** Pages 109 and 110 explain these codes and provide other essential information on entering ***Ahoy!*** programs. Refer to these pages **before** entering any programs!

```
•144 DATA0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,
0,0,0,0,0,0,0,0,0,0,0,0,17,17,16,42,170    AE
•145 DATA170,4,68,0,0,0,0,0,0,0,0,0,0,0,0
,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0       JN
•146 DATA0,0,0,0,20,0,0,8,0,0,8,0,0,8,0,0
,8,0,0,8,0,0,20,0,0,34                     AL
•147 DATA0,7,255,224,15,255,240,15,0,240,
14,0,112,14,0,112,14,0,112,14,0            KL
•148 DATA112,7,0,224,3,129,192,0,0,0,0,0,
0,0,0,0                                    KC
•149 DATA0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,
0,0,0,0,0,0,0,0,28,166,192                 KH
•150 DATA127,255,254,255,255,255,146,73,3
7,255,255,255,255                          ED
•151 DATA255,255,192,127,255,213,127,255   EC
•152 DATA215,127,255,209,124,33,192,124,3
3,255,252,169,255,252,33                   EO
•153 DATA0,24,0,0,60,0,0,126,0,0,255,0,1,
231,128,3,195,192,3,195,192,3,231,192      ML
•154 DATA3,255,192,3,255,192,3,36,192,3,3
6,192,3,32,192,3,32,192,3,60,192,3,60      JL
•155 DATA192,3,255,192,3,255,192,0,60,0,1
,255,128,7,255,224                         ND
•156 PRINT"[CLEAR]ERROR IN DATA STATEMENT
S [RED]132-137":END                        LP
•157 PRINT"[CLEAR]ERROR IN DATA STATEMENT
S [RED]138-"                               KF
```

CATACOMBS
FROM PAGE 89

```
•10 REM ******************************     DD
•20 REM *        CATACOMBS V1.0      *     HA
•30 REM *    BY CLEVE BLAKEMORE      *     HG
•40 REM ******************************     DD
•50 POKE53281,.:POKE53280,.:PRINT"[CLEAR]
[6"[DOWN]"]"TAB(14)CHR$(8)CHR$(142)"[BLU
E][RVSON] CATACOMBS "                      CB
•60 PRINTTAB(6)"[3"[DOWN]"][RVSON][c 4] P
LEASE WAIT[3"."]LOADING DATA! ":GOSUB840   IP
•70 POKE53272,30:POKE53265,PEEK(53265)OR6
4                                          KG
•80 PRINT"[HOME][13"[DOWN]"]"TAB(15)"SKUL
L  #[DOWN]":PRINTTAB(15)"WIZARD $[DOWN]"   KO
•90 PRINTTAB(15)"BAT[4" "]%[DOWN]":PRINTT
AB(15)"SPIRIT &[DOWN]":PRINTTAB(15)"SNAK
E  '[DOWN]"                                JM
•100 B=49152:E=53151:V=53248:S=1024:X=10:
Y=5:MX=.:MY=.:R=80:SR=40:M=32              KC
•110 L=.:EX=239:JY=56321:SO=54272:DEF FNA
(B)=Y*SR+X+S:DEF FNB(B)=PEEK(TY*SR+TX+S)   JD
•120 DEF FNX(B)=(X-3)*8+28+((X>31)*255):D
EFFNE(B)=(X>31)*-1:DEFFNY(X)=Y*8+35        KD
•130 DEF FNJ(X)=15-(PEEK(JY)AND15):DEF FN
C(X)=B+MX+TX+((MY+TY)*R)                   IJ
•140 DEF FNCX(B)=CX(D)+(CX(D)<MX+X)*-1+(C
X(D)>MX+X)*1                               LL
•150 DEF FNCY(B)=CY(D)+(CY(D)<MY+Y)*-1+(C
Y(D)>MY+Y)*1                               CF
•160 DEF FNK(Q)=PEEK(FNC(.))=M(L)          BD
•170 DEFFNCH(B)=(FNB(.)=M+8)*-1+(FNB(.)=M
+9)*-2+(FNB(.)=M+13)*-3                    EB
•180 DEFFNET(B)=TX<1ORTX>38ORTY<2ORTY>23   MG
•190 DEF FNM(X)=(B+CX(D)+(CY(D)*R)):DEF F
NW(X)=PEEK(FNM(.))<>M:GOSUB640             EL
•200 POKEV+27,1:POKEV+39,7:POKEV+23,1:POK
EV+29,1:POKEV,FNX(.):POKEV+1,FNY(.)        BA
•210 POKE2040,15:POKEV+21,1:POKEV+34,1:PO
KEV+36,11                                  EH
•220 FORD=SOTOSO+24:POKED,.:NEXT:POKESO,2
55:POKESO+1,27:POKESO+5,64                 GE
•230 POKESO+6,128:POKESO+24,10             CN
•240 D=.:GOTO280                           JA
•250 REM JOYSTICK ROUTINE                  EM
•260 TX=MX+X(J):TY=MY+Y(J):IFTX<0ORTX>410
RTY<0ORTY>25THEN280                        IO
•270 POKESO+4,33:MX=TX:MY=TY               DM
•280 SYS828,MX,MY:POKEFNA(.),.             LM
•290 POKESO+4,.:J=FNJ(.):TX=X+X(J):TY=Y+Y
(J):IFFNK(.)THEN440                        KB
•300 IFFNB(.)=MTHEN340                     DF
•310 ONFNCH(.)GOSUB510,520,530             CP
•320 IFFNB(.)=EXANDKTHEN540                NB
•330 GOTO390                               CE
•340 IFFNET(.)THEN260                      IA
•350 POKESO+4,129:IFX<>TXORY<>TYTHENPOKEF
NA(.),M                                    ED
•360 X=TX:Y=TY:POKEFNA(.),.:POKEV+16,FNE(
.):POKEV,FNX(.):POKEV+1,FNY(.)             EF
•370 POKESO+4,.                            HE
•380 REM MONSTER MOVEMENT                  CJ
•390 D=D+1+(D=2)*3                         BJ
•400 POKEFNM(.),M:TX=CX(D):TY=CY(D):CX(D)
=FNCX(.):IFFNW(.)THENCX(D)=TX              DE
•410 CY(D)=FNCY(.):IFFNW(.)THENCY(D)=TY    CP
•420 POKEFNM(.),M(L)                       CF
•430 GOTO280                               CG
•440 GOSUB610:PRINT"[WHITE][RVSON][LEFT]C
HOMP";:GOSUB620                            EO
•450 POKEV+21,.:POKEV+33,.                 KA
•460 PRINT"[CLEAR]"TAB(13)"[RVSON][3"[DOW
N]"] GOLD = ";G:PRINT"[4"[DOWN]"][7"[RIG
HT]"][RVSON] ANOTHER GAME ?[Y OR N]"       FP
•470 POKE198,.                             JP
•480 GETA$:IFA$=""THEN480                  HD
•490 IFA$="N"THENPOKE679,.:SYS679          BP
•500 POKEV+24,21:POKEV+17,PEEK(V+17)AND19
1:RUN                                      MN
•510 GOSUB610:PRINT"[RVSON]G 50":G=G+50:G
OSUB620:RETURN                             OA
```

```
·520 GOSUB610:PRINT"[RVSON] KEY ":K=1:G=G
+100:GOSUB620:RETURN                            NH
·530 GOSUB610:POKEV+33,2:GOSUB620:POKEV+3
3,.:G=G-(G>49)*-50:RETURN                       CM
·540 POKEV+21,.:L=L+1:IFL=10THEN450             NE
·550 K=.:PRINT"[CLEAR][6"[DOWN]"]"TAB(4)"
[RVSON] PREPARE FOR THE NEXT LEVEL !! "         JG
·560 PRINT"[3"[DOWN]"]"TAB(4)"[RVSON]  DE
SCENDING DOWN TO LEVEL";L+1;"[LEFT][3" "
][DOWN]"                                        FP
·570 POKESO+4,17:FORD=100TO.STEP-1::FORX=
.TO50:NEXT:POKESO+1,D:NEXT:POKESO+1,27          GD
·580 POKESO+4,.:G=G+25:PRINTTAB(14)"[RVSO
N]  GOLD = ";G;                                 GI
·590 GOSUB640:MX=.:MY=.:X=10:Y=5:D=.:POKE
V,FNX(.):POKEV+1,FNY(.)                         IG
·600 POKEV+16,FNE(.):POKEV+21,1:GOTO280         HO
·610 POKEFNC(.),M:POKEV+21,.:POKE781,Y:PO
KE782,X-1:POKE783,.:SYS65520:RETURN             IH
·620 POKESO+4,17:FORQ=.TO500:NEXT:POKEV+2
1,1:POKESO+4,.:RETURN                           BM
·630 REM DUNJON GENERATOR                       AF
·640 SYS916:POKEV+33,(L<5)*-15:FORQ=192TO
204STEP4:POKE648,Q:PRINT"[BLACK][CLEAR]"
:FORD=1TO3                                      OL
·650 FORX=.TO7:IF(2[UPARROW]XANDL(L))THEN
PRINT"[RVSON][11"+"][RVSOFF][13" "]";SPC
(40);                                           IM
·660 PRINT"  [RVSON][3"+"][RVSOFF][8" "][
RVSON][3"+"][RVSOFF]";                          HF
·670 NEXT:NEXT:NEXT:POKE648,4:POKE53283,L
+2:FORA=BTOB+R:POKEA,42+64*3:NEXT               NC
·680 FORA=E-RTOE+1:POKEA,42+64*3:NEXT:FOR
A=BTOESTEPR:POKEA,42+64*3:NEXT                  PC
·690 POKEB+3+R*3,47+64                          EC
·700 A=RND(1)*60+8:Q=RND(1)*40+5:IFPEEK(B
+A+Q*R)<>MTHEN700                               HA
·710 POKEB+Q*R+A,EX                             IH
·720 FORD=1TOL*2                                IP
·730 A=RND(1)*70+5:Q=RND(1)*40+5:IFPEEK(B
+Q*R+A)<>MTHEN730                               LF
·740 POKEB+Q*R+A,M+8:NEXT                       NO
·750 FORD=1TOL*2                                IP
·760 A=RND(1)*70+5:Q=RND(1)*40+5:IFPEEK(B
+Q*R+A)<>MTHEN760                               LE
·770 POKEB+Q*R+A,M+13:NEXT                      AF
·780 A=RND(1)*70+5:Q=RND(1)*40+5:IFPEEK(B
+Q*R+A)<>MTHEN780                               LG
·790 POKEB+Q*R+A,M+9                            BK
·800 FORD=.TO2                                  HP
·810 A=RND(1)*70+5:Q=RND(1)*40+5:IFPEEK(B
+Q*R+A)<>MTHEN810                               LA
·820 CX(D)=INT(A):CY(D)=INT(Q):NEXT:RETUR
N                                               HD
·830 REM REDEFINED CHARACTERS                   AO
·840 FORX=1TO33:READA:POKE680+X,A:NEXT:PO
KE56334,PEEK(56334)AND254                       CE
·850 POKE1,PEEK(1)AND251:SYS681:POKE1,PEE
K(1)OR4:POKE56334,PEEK(56334)OR1                JE
·860 READA:IFA=-1THEN890                        MP
·870 FORX=.TO7:READD:POKE14336+A*8+X,D:NE
XT:GOTO860                                      BC
·880 REM ML SCROLL ROUTINE                      BE
·890 DIMX(10),Y(10),CX(2),CY(2),M(9),L(9)
:FORA=.TO10:READX(A),Y(A):NEXT                  AP
·900 FORA=828TO914:READB:POKEA,B:NEXT:FOR
A=.TO63:POKE15*64+A,255:NEXT                    BL
·910 FORA=.TO9:READL(A):NEXT:FORA=.TO9:RE
ADM(A):NEXT:FORX=916TO951:READA:POKEX,A         GA
·920 NEXT:RETURN                                EJ
·930 DATA 169,,133,251,133,253,169,208,13
3,252,169,56,133,254,162,8                      GN
·940 DATA 160,,177,251,145,253,136,208,24
9,230,252,230,254,202,208,240,96                IC
·950 DATA000,152,152,190,217,024,060,036,
195                                             FG
·960 DATA035,126,153,153,153,126,066,090,
126                                             OJ
·970 DATA036,024,126,024,126,153,060,126,
126                                             NE
·980 DATA037,000,036,126,219,129,066,000,
000                                             JA
·990 DATA038,031,021,021,014,028,156,248,
112                                             OK
·1000 DATA039,060,066,002,028,032,024,004
,008                                            MJ
·1010 DATA040,000,000,255,129,255,153,129
,255                                            AP
·1020 DATA041,062,034,062,008,008,056,008
,056                                            LO
·1030 DATA042,255,129,189,165,165,189,129
,255                                            BA
·1040 DATA043,249,249,000,159,159,000,249
,249                                            OB
·1050 DATA045,000,000,000,000,016,000,000
,000                                            JA
·1060 DATA047,129,066,036,024,024,036,066
,129,-1                                         BF
·1070 DATA0,0,0,-1,0,1,0,0,-1,0,-1,-1,-1,
1,0,0,1,0,1,-1,1,1                              GJ
·1080 DATA 32,155,183,138,24,105,0,133,4,
169,192,105,0,133,5,32,155,183,224              PE
·1090 DATA 0,240,16,165,4,24,105,80,133,4
,165,5,105,0,133,5,202,208,240                  JC
·1100 DATA 169,0,133,2,169,4,133,3,162,24
,160,39,177,4,145,2,136,16,249                  LL
·1110 DATA 165,2,24,105,40,133,2,165,3,10
5,0,133,3,165,4,24,105,80,133                   DP
·1120 DATA 4,165,5,105,0,133,5,202,16,218
,96                                             HF
·1130 DATA 201,223,178,245,251,199,143,12
4,211,255                                       MJ
·1140 DATA 35,36,37,38,39,35,36,37,38,39        KN
·1150 DATA 169,0,133,251,169,192,133,252,
162,20,160,0,169,32,145,251,200                 FH
·1160 DATA 192,201,208,247,24,169,200,101
```

```
,251,133,251,144,2,230,252,202                    HH
·1170 DATA 208,231,96                             JF
```

BASIC AHOY!

FROM PAGE 58

Starting address in hex: 9000
Ending address in hex: 9FF0
SYS to start: 36864

***Flankspeed* required for entry! See page 111.**

```
9000: AD 02 DD 09 03 8D 02 DD 07
9008: AD 00 DD 29 FD 8D 00 DD 26
9010: A9 04 8D 18 D0 A9 80 8D EB
9018: 88 02 A9 04 85 2C A9 00 AB
9020: 8D 00 04 A9 80 85 38 A9 43
9028: 91 8D 18 03 8D 16 03 A9 B2
9030: 9F 8D 19 03 8D 17 03 A9 CA
9038: 01 8D 20 D0 8D 21 D0 A9 E0
9040: 0E 8D 86 02 4C 93 90 93 68
9048: 0D 42 41 53 49 43 20 41 1A
9050: 48 4F 59 21 20 20 20 20 E2
9058: 20 20 20 20 20 20 20 20 59
9060: 33 31 37 34 31 20 42 59 1D
9068: 54 45 53 20 46 52 45 45 98
9070: 2E 0D 20 20 20 20 20 20 6C
9078: 20 20 42 59 20 43 41 52 4B
9080: 4C 4F 53 20 44 45 20 4C 85
9088: 41 20 47 55 41 52 44 49 A7
9090: 41 0D 00 A2 00 BD 47 90 17
9098: C9 00 F0 07 20 D2 FF E8 36
90A0: 4C 95 90 A9 00 8D 86 02 D2
90A8: A2 07 BD 04 03 9D A7 02 5E
90B0: BD C7 91 9D 04 03 CA 10 47
90B8: F1 60 20 7C A5 A2 00 A0 90
90C0: 04 84 0F BD 00 02 85 08 A5
90C8: C9 22 F0 4F 24 0F 70 26 BE
90D0: C9 41 90 22 C9 5B B0 1E 82
90D8: 84 71 A0 4C 84 0B A0 FF EB
90E0: 86 7A CA C8 E8 BD 00 02 1E
90E8: 38 F9 CF 91 F0 F5 C9 80 AD
90F0: D0 30 05 0B A4 71 E8 C8 C9
90F8: 99 FB 01 B9 FB 01 F0 36 6D
9100: 38 E9 3A F0 04 C9 49 D0 35
9108: 02 85 0F 38 E9 55 D0 B3 9A
9110: 85 08 BD 00 02 F0 DF C5 F3
9118: 08 F0 DB C8 99 FB 01 E8 35
9120: D0 F0 A6 7A E6 0B C8 B9 77
9128: CE 91 10 FA B9 CF 91 D0 7F
9130: B4 BD 00 02 10 BE 99 FD 0B
9138: 01 A9 FF 85 7A 60 10 2A 7D
9140: C9 FF F0 26 24 0F 30 22 A6
9148: C9 CC 90 24 38 E9 CB AA 2C
9150: 84 49 A0 FF CA F0 08 C8 4B
9158: B9 CF 91 10 FA 30 F5 C8 6D
9160: B9 CF 91 30 08 20 47 AB C6
9168: D0 F5 4C F3 A6 4C EF A6 F8
9170: 4C 1A A7 20 73 00 C9 CC A8
9178: 90 15 20 80 91 4C AE A7 F2
9180: E9 CC 0A A8 B9 5E 92 48 DC
9188: B9 5D 92 48 4C 73 00 20 5A
9190: 79 00 4C E7 A7 A9 00 85 15
9198: 0D 20 73 00 C9 FF F0 21 15
91A0: C9 E8 90 1D 38 E9 E8 0A 16
91A8: 48 20 73 00 20 F1 AE 68 AD
91B0: A8 B9 95 92 85 55 B9 96 66
91B8: 92 85 56 20 54 00 4C 8D 75
91C0: AD 20 79 00 4C 8D AE BA 4B
91C8: 90 3E 91 73 91 95 91 50 A5
91D0: 41 55 53 C5 43 4F 4C 4F AE
91D8: 55 D2 43 55 52 53 D2 50 62
91E0: 4C 41 D9 45 4E 56 45 4C C3
91E8: 4F 50 C5 54 45 4D 50 CF 55
91F0: 56 4F CC 57 49 4E 44 4F E5
91F8: D7 50 52 54 D9 43 4C D3 05
9200: 48 4F 4D C5 46 49 4C CC 53
9208: 46 43 4F CC 53 43 52 4F E5
9210: 4C CC 51 55 49 D4 43 53 84
9218: 45 D4 46 4C 49 D0 43 48 6A
9220: 41 D2 4F 46 C6 50 4C 41 6E
9228: 43 C5 53 50 52 49 54 C5 8A
9230: 42 43 4F CC 4D 4F 44 C5 78
9238: 52 41 53 54 45 D2 44 4F 1F
9240: 57 4E 4C C4 57 49 50 C5 AD
9248: 50 4C 4F D4 52 45 50 45 36
9250: 41 D4 4A 4F D9 42 55 4D BE
9258: D0 42 49 CE 00 9A 92 CD 7E
9260: 92 FB 92 FE 94 1F 93 5A 22
9268: 96 8B 96 EC 96 AC 9F 8A 7B
9270: 97 B9 97 2D 97 55 97 D7 E2
9278: 97 49 99 4C 99 6B 99 96 74
9280: 99 F7 99 20 9A 87 9A 2B B3
9288: 9C 4A 9C B2 9D 0F 9E 6C 76
9290: 9E 8E 9E DD 9F 7E 9B C5 B9
9298: 9B F0 9C 20 8A AD 20 F7 32
92A0: B7 A6 15 A4 14 E0 00 D0 7E
92A8: 08 C0 00 D0 04 20 C7 92 C0
92B0: 60 C0 00 F0 09 88 A5 A2 9C
92B8: C5 A2 F0 FC D0 F3 E0 00 B4
92C0: F0 04 CA 4C B5 92 60 20 95
92C8: E4 FF F0 FB 60 EA 20 8A 90
92D0: AD 20 F7 B7 A5 14 29 0F 40
92D8: 8D 20 D0 20 FD AE 20 8A CE
92E0: AD 20 F7 B7 A5 14 29 0F 50
92E8: 8D 21 D0 20 FD AE 20 8A DF
92F0: AD 20 F7 B7 A5 14 29 0F 60
92F8: 8D 86 02 60 20 9E B7 86 6C
9300: FB 20 00 E2 A5 FB A8 C0 0A
9308: 28 10 12 E0 19 10 0E 18 82
9310: 20 F0 FF 20 06 E2 20 0E 58
9318: E2 20 A0 AA 60 4C 48 B2 0E
9320: 20 9E B7 E0 0A B0 5F 8E 20
9328: 34 03 AD 34 03 0A 0A 0A 62
9330: 8D 34 03 4C 89 93 02 00 60
9338: 06 06 41 00 02 00 00 09 90
9340: 00 00 41 00 06 00 00 09 90
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9348: 00 00 11 00 00 00 00 08 61
9350: 00 00 81 00 00 00 08 09 E2
9358: 04 01 41 00 02 00 00 09 A9
9360: 09 00 41 00 08 00 08 04 BE
9368: 08 00 11 00 00 00 00 09 8A
9370: 02 01 21 00 00 00 09 04 A1
9378: 04 00 11 00 00 00 03 03 93
9380: 05 03 21 00 00 00 4C 48 3E
9388: B2 A9 00 8D 35 03 20 06 D0
9390: E2 20 00 E2 8A AC 34 03 E4
9398: 99 36 93 C8 84 B0 20 06 20
93A0: E2 20 00 E2 A4 B0 8A 99 FF
93A8: 36 93 C8 84 B0 20 06 E2 79
93B0: 20 00 E2 A4 B0 8A 99 36 63
93B8: 93 C8 84 B0 20 06 E2 20 73
93C0: 00 E2 A4 B0 8A 99 36 93 E6
93C8: C8 84 B0 20 06 E2 20 00 EF
93D0: E2 A4 B0 8A 99 36 93 C8 BF
93D8: 84 B0 20 06 E2 20 FD AE E3
93E0: 20 8A AD 20 F7 B7 A4 B0 5E
93E8: A5 14 99 36 93 C8 A5 15 89
93F0: 99 36 93 60 01 C3 01 FA 75
93F8: 01 0C 01 2D 01 51 01 66 ED
9400: 01 91 01 DD 01 FA 01 1C 8A
9408: 01 3E 01 51 01 7B 01 A9 C0
9410: 03 86 03 F4 02 18 02 5A 08
9418: 02 A3 02 CC 03 23 03 BB 71
9420: 03 F4 02 38 02 7D 02 A3 77
9428: 02 F6 03 53 07 0C 07 E9 7B
9430: 04 30 04 B4 05 47 05 98 07
9438: 06 47 07 77 07 E9 04 70 69
9440: 04 FB 05 47 05 ED 06 A7 2D
9448: 0E 18 0F D2 08 61 09 68 2B
9450: 0A 8F 0B 30 0C 8F 0E EF BE
9458: 0F D2 08 E1 09 F7 0A 8F BE
9460: 0B DA 0D 4E 1C 31 1F A5 B3
9468: 10 C3 12 D1 15 1F 16 60 CA
9470: 19 1E 1D DF 1F A5 11 C3 3E
9478: 13 EF 15 1F 17 B5 1A 9C 33
9480: 38 63 3F 4B 21 87 25 A2 17
9488: 2A 3E 2C C1 32 3C 3B BE 47
9490: 3F 4B 23 86 27 DF 2A 3E 34
9498: 2F 6B 35 39 70 C7 7E 97 EF
94A0: 43 0F 4B 45 54 7D 59 83 32
94A8: 64 79 77 7C 7E 97 47 0C E3
94B0: 4F BF 54 7D 5E D6 6A 73 A4
94B8: E1 8F FD 2E 86 1E 96 8B 1D
94C0: A8 FA B3 06 C8 F3 EE F8 C2
94C8: FD 2E 8E 18 9F 7E A8 FA 5D
94D0: BD AC D4 E6 06 04 0B 08 14
94D8: 17 0F 2D 1E 5A 3C 41 42 64
94E0: 43 44 45 46 47 C1 C2 C3 83
94E8: C4 C5 C6 C7 D3 53 C9 49 3C
94F0: D1 51 C8 48 D7 57 EA 0E 4D
94F8: 0F 10 11 12 13 14 EA 20 6D
9500: 9E AD 20 A3 B6 A6 22 A4 34
9508: 23 86 B0 84 B1 8D 3B 03 64
9510: A0 00 B1 B0 A2 00 DD DE 72
9518: 94 D0 03 4C 9D 95 E8 E0 C9
9520: 0E D0 F3 A2 00 DD EC 94 F4
9528: D0 03 4C 94 95 E8 E0 0A 46
9530: D0 F3 C9 52 D0 03 4C B5 E6
9538: 95 C9 4F D0 03 4C 7C 95 19
9540: C9 20 F0 15 C9 56 D0 03 24
9548: 4C A6 96 C9 40 F0 13 C9 A9
9550: 54 D0 03 4C 65 95 4C 08 14
9558: AF C8 CC 3B 03 F0 03 4C 1C
9560: 12 95 A9 00 60 C8 B1 B0 3D
9568: 20 74 95 0A 0A 0A 8D 34 72
9570: 03 4C 59 95 38 E9 30 C9 CA
9578: 0A B0 DB 60 C8 B1 B0 20 BA
9580: 74 95 85 C2 0A 18 65 C2 1D
9588: 0A 18 65 C2 0A 0A 8D 35 A9
9590: 03 4C 59 95 BD D4 94 8D 83
9598: 36 03 4C 59 95 86 02 A5 3B
95A0: 02 0A 18 6D 35 03 AA BD D2
95A8: F4 93 85 BB E8 BD F4 93 A1
95B0: 85 BC 4C BB 95 A9 00 85 BF
95B8: BB 85 BC AE 34 03 BD 36 90
95C0: 93 0A 0A 0A 0A 85 24 E8 0F
95C8: BD 36 93 18 65 24 85 02 79
95D0: 8A 48 A5 02 AE FC 94 9D 29
95D8: 00 D4 68 AA E8 BD 36 93 31
95E0: 0A 0A 0A 0A 85 24 E8 BD 59
95E8: 36 93 18 65 24 85 02 8A 66
95F0: 48 A5 02 AE FD 94 9D 00 BF
95F8: D4 68 AA E8 BD 36 93 85 D6
9600: 02 8A 48 A5 02 AE FB 94 BB
9608: 9D 00 D4 68 AA E8 BD 36 6A
9610: 93 85 02 8A 48 A5 02 AE 54
9618: F9 94 9D 00 D4 68 AA E8 15
9620: BD 36 93 85 02 8A 48 A5 A7
9628: 02 AE FA 94 9D 00 D4 68 43
9630: AA A5 BC AE F7 94 9D 00 16
9638: D4 A5 BB AE F8 94 9D 00 48
9640: D4 AD 36 03 AA E0 00 F0 78
9648: 09 CA A5 A2 C5 A2 F0 FC BA
9650: D0 F3 AE FB 94 DE 00 D4 08
9658: 4C 59 95 20 9E B7 E0 1E 09
9660: B0 03 4C 48 B2 86 02 A2 86
9668: 09 A5 02 9D D4 94 4A CA 35
9670: CA 9D D4 94 18 65 02 E8 AA
9678: 9D D4 94 4A CA CA 9D D4 D1
9680: 94 E8 A5 02 4A 85 02 E0 58
9688: 01 D0 DE 60 20 8A AD 20 12
9690: F7 B7 A5 15 F0 03 4C 48 83
9698: B2 A5 14 C9 10 90 03 4C BE
96A0: 48 B2 8D 18 D4 60 C8 B1 F0
96A8: B0 20 74 95 C9 04 B0 0A 0C
96B0: C9 00 F0 06 20 BD 96 4C 32
96B8: 59 95 4C 48 B2 C9 03 F0 AC
96C0: 27 C9 02 F0 1E A2 00 8E F3
96C8: F7 94 E8 8E F8 94 E8 8E D1
96D0: F9 94 E8 8E FA 94 E8 8E DD
96D8: FB 94 E8 8E FC 94 E8 8E E9
96E0: FD 94 60 A2 07 4C C7 96 28
```

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96E8: A2 0E 4C C7 96 20 9E B7 BA
96F0: E0 28 10 37 8E 26 97 20 AD
96F8: 00 E2 E0 19 10 2D 8E 28 C9
9700: 97 20 00 E2 E0 28 10 23 D6
9708: 8E 27 97 20 00 E2 E0 19 52
9710: 10 19 8E 29 97 AE 27 97 F5
9718: EC 26 97 90 0E AE 29 97 D0
9720: EC 28 97 90 06 60 00 27 EA
9728: 0A 14 00 4C 48 B2 20 9E 4C
9730: B7 8E 7E 97 AE 29 97 20 1C
9738: 41 97 CA EC 28 97 10 F7 90
9740: 60 AC 27 97 20 F0 E9 20 27
9748: 24 EA AD 7E 97 91 D1 88 07
9750: CC 26 97 10 F5 60 20 9E FF
9758: B7 8E 7F 97 AE 29 97 20 45
9760: 69 97 CA EC 28 97 10 F7 E0
9768: 60 AC 27 97 20 F0 E9 20 4F
9770: 24 EA AD 7F 97 91 F3 88 52
9778: CC 26 97 10 F5 60 20 0E 97
9780: A2 00 20 06 E2 20 9E B7 A2
9788: 4C 8E 97 20 80 97 E0 00 14
9790: D0 05 A9 93 4C D2 FF A2 65
9798: 20 20 31 97 AE 21 D0 20 62
97A0: 59 97 AD 26 97 8D D6 97 F8
97A8: AD 28 97 8D D7 97 60 A2 16
97B0: 00 20 06 E2 20 9E B7 4C 7C
97B8: BD 97 20 AF 97 E0 00 D0 27
97C0: 05 A9 13 4C D2 FF AE 28 78
97C8: 97 8E D7 97 AC 26 97 8C 55
97D0: D6 97 18 4C F0 FF 00 00 94
97D8: 20 9E B7 8E E7 97 20 00 7D
97E0: E2 8E E8 97 4C E9 97 04 A4
97E8: 00 AD E7 97 F0 1C C9 01 ED
97F0: D0 03 4C 13 98 C9 02 D0 59
97F8: 03 4C 33 98 C9 03 D0 03 B4
9800: 4C A7 98 C9 04 D0 03 4C 7A
9808: C7 98 4C 48 B2 CA 60 00 DA
9810: 27 14 0A A9 C8 8D 0D 98 FA
9818: AD 26 97 8D 0F 98 AD 27 8D
9820: 97 8D 10 98 AD 28 97 8D E8
9828: 11 98 AD 29 97 8D 12 98 78
9830: 4C 50 98 A9 88 8D 0D 98 CA
9838: AD 26 97 8D 10 98 AD 27 AE
9840: 97 8D 0F 98 AD 28 97 8D 08
9848: 11 98 AD 29 97 8D 12 98 98
9850: AE 12 98 20 5D 98 CA EC 77
9858: 11 98 10 F7 60 AC 0F 98 BE
9860: 20 F0 E9 20 24 EA B1 D1 0E
9868: 48 B1 F3 48 A9 20 91 D1 CB
9870: AD 21 D0 91 F3 20 0D 98 5B
9878: B1 D1 8D 7E 97 B1 F3 8D D2
9880: 7F 97 68 91 F3 68 91 D1 51
9888: AD 7E 97 48 AD 7F 97 48 A1
9890: CC 10 98 D0 E0 AD E8 97 E5
9898: D0 03 68 68 60 AC 0F 98 F1
98A0: 68 91 F3 68 91 D1 60 A9 64
98A8: E8 8D 0D 98 AD 26 97 8D BD
98B0: 0F 98 AD 27 97 8D 10 98 FA
98B8: AD 28 97 8D 11 98 AD 29 34
98C0: 97 8D 12 98 4C E7 98 A9 07
98C8: CA 8D 0D 98 AD 26 97 8D BF
98D0: 0F 98 AD 27 97 8D 10 98 1B
98D8: AD 28 97 8D 12 98 AD 29 55
98E0: 97 8D 11 98 4C E7 98 AC 29
98E8: 10 98 20 F4 98 88 CC 0F A3
98F0: 98 10 F7 60 AE 11 98 20 6A
98F8: F0 E9 20 24 EA B1 D1 48 CE
9900: B1 F3 48 A9 20 91 D1 AD C8
9908: 21 D0 91 F3 20 0D 98 20 65
9910: F0 E9 20 24 EA B1 D1 8D 2B
9918: 7E 97 B1 F3 8D 7F 97 68 E0
9920: 91 F3 68 91 D1 AD 7E 97 35
9928: 48 AD 7F 97 48 EC 12 98 15
9930: D0 DA AD E8 97 D0 03 68 46
9938: 68 60 AE 11 98 20 F0 E9 54
9940: 20 24 EA 68 91 F3 68 91 57
9948: D1 60 4C E2 FC 20 9E B7 1D
9950: E0 08 10 08 8A 0A 8D 5F D2
9958: 99 4C 60 99 4C 48 B2 00 7F
9960: AD 18 D0 29 F0 0D 5F 99 17
9968: 8D 18 D0 60 20 9E B7 E0 96
9970: 04 10 E9 8A 0A 0A 0A 0A 21
9978: 8D 5F 99 AD 18 D0 29 0F CD
9980: 0D 5F 99 8D 18 D0 A9 80 27
9988: E0 00 F0 07 CA 18 69 04 B1
9990: 4C 88 99 8D 88 02 60 20 97
9998: 9E B7 8A 20 BA 99 0A 26 1E
99A0: C2 0A 26 C2 0A 26 C2 85 CE
99A8: C1 A5 C3 18 65 C1 85 C1 5A
99B0: A5 C4 18 65 C2 85 C2 4C EF
99B8: E1 99 48 A9 00 85 C1 85 F2
99C0: C2 AD 18 D0 29 0E 4A AA 46
99C8: A9 80 85 C4 A9 00 85 C3 30
99D0: E0 00 F0 0B A5 C4 18 69 99
99D8: 08 85 C4 CA 4C D0 99 68 15
99E0: 60 20 00 E2 8A A8 84 02 FD
99E8: C0 08 30 03 4C 48 B2 20 4C
99F0: 00 E2 8A A4 02 91 C1 60 B8
99F8: 20 9E B7 E0 08 30 0B 4C DF
9A00: 48 B2 01 02 04 08 10 20 3A
9A08: 40 80 BD 02 9A 85 C1 AD 18
9A10: 15 D0 48 A9 FF 38 E5 C1 C7
9A18: 85 C1 68 25 C1 8D 15 D0 22
9A20: 60 20 9E B7 E0 08 30 03 13
9A28: 4C 48 B2 BD 02 9A 85 C1 11
9A30: 86 C2 85 C4 20 FD AE 20 B0
9A38: 8A AD 20 F7 B7 A5 15 C9 C4
9A40: 02 30 03 4C 48 B2 A5 14 76
9A48: 48 A5 C2 0A AA 68 9D 00 B3
9A50: D0 A5 15 F0 0B AD 10 D0 66
9A58: 05 C1 8D 10 D0 4C 71 9A E5
9A60: AD 10 D0 48 A9 FF 38 E5 FE
9A68: C1 85 C1 68 25 C1 8D 10 5E
9A70: D0 20 00 E2 86 C3 A5 C2 F6
9A78: 0A AA A5 C3 9D 01 D0 AD B3
9A80: 15 D0 05 C4 8D 15 D0 60 04
```

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9A88: 20 9E B7 E0 08 30 03 4C 67
9A90: 48 B2 86 C1 AD 18 D0 4A B4
9A98: 4A 4A 4A 0A 0A 85 C4 A5 7B
9AA0: C4 18 69 83 85 C4 A9 F8 57
9AA8: 85 C3 20 00 E2 8A A4 C1 E5
9AB0: 91 C3 20 00 E2 8A 29 0F CB
9AB8: A6 C1 9D 27 D0 A6 C1 BD DC
9AC0: 02 9A 85 C3 20 00 E2 E0 8A
9AC8: 04 30 03 4C 48 B2 E0 00 28
9AD0: D0 1A A9 FF 38 E5 C3 85 CC
9AD8: C3 AD 1D D0 25 C3 8D 1D CB
9AE0: D0 AD 17 D0 25 C3 8D 17 D4
9AE8: D0 4C 38 9B E0 01 D0 1A A6
9AF0: AD 1D D0 05 C3 8D 1D D0 D0
9AF8: A9 FF 38 E5 C3 85 C3 AD 7B
9B00: 17 D0 25 C3 8D 17 D0 4C 92
9B08: 38 9B E0 02 D0 1A AD 17 6E
9B10: D0 05 C3 8D 17 D0 A9 FF C8
9B18: 38 E5 C3 85 C3 AD 1D D0 DE
9B20: 25 C3 8D 1D D0 4C 38 9B A4
9B28: AD 17 D0 05 C3 8D 17 D0 FB
9B30: AD 1D D0 05 C3 8D 1D D0 10
9B38: 20 00 E2 E0 00 D0 17 A6 AA
9B40: C1 BD 02 9A 85 C3 A9 FF 4F
9B48: 38 E5 C3 85 C3 AD 1C D0 0E
9B50: 25 C3 8D 1C D0 60 A6 C1 7C
9B58: BD 02 9A 85 C3 AD 1C D0 96
9B60: 05 C3 8D 1C D0 20 06 E2 AC
9B68: 20 00 E2 8A 29 0F 8D 25 E0
9B70: D0 20 06 E2 20 00 E2 8A D7
9B78: 29 0F 8D 26 D0 60 A5 15 50
9B80: 48 A5 14 48 20 F7 B7 A5 40
9B88: 15 F0 03 4C 48 B2 A5 14 92
9B90: C9 01 F0 07 C9 02 F0 13 23
9B98: 4C 48 B2 AD 01 DC 29 1F B3
9BA0: 49 1F 85 63 A9 00 85 62 83
9BA8: 4C B8 9B AD 00 DC 29 1F 1C
9BB0: 49 1F 85 63 A9 00 85 62 93
9BB8: 68 85 14 68 85 15 A2 90 F0
9BC0: 38 20 49 BC 60 A5 15 48 82
9BC8: A5 14 48 20 F7 B7 A5 15 55
9BD0: F0 03 4C 48 B2 A5 14 C9 8F
9BD8: 08 30 03 4C 48 B2 AA BD C3
9BE0: 02 9A 85 C1 AD 1E D0 25 86
9BE8: C1 D0 07 A9 00 85 63 4C 61
9BF0: F6 9B A9 01 85 63 AD 1F E3
9BF8: D0 25 C1 F0 07 A9 02 18 6C
9C00: 65 63 85 63 A9 00 85 62 43
9C08: 68 85 14 68 85 15 A9 FF B6
9C10: 38 E5 C1 85 C1 AD 1E D0 D3
9C18: 25 C1 8D 1E D0 AD 1F D0 19
9C20: 25 C1 8D 1F D0 A2 90 38 EF
9C28: 20 49 BC 60 20 9E B7 8A AF
9C30: 29 0F AA 8E 22 D0 20 00 B4
9C38: E2 8A 29 0F AA 8E 23 D0 0B
9C40: 20 00 E2 8A 29 0F AA 8E 3F
9C48: 24 D0 60 20 9E B7 E0 05 F9
9C50: 30 03 4C 48 B2 E0 00 D0 7C
9C58: 18 AD 16 D0 29 0F 8D 16 E0
9C60: D0 AD 11 D0 29 9F 8D 11 28
9C68: D0 A9 04 8D 5F 99 4C 60 1A
9C70: 99 E0 01 D0 18 AD 11 D0 64
9C78: 29 9F 8D 11 D0 AD 16 D0 45
9C80: 09 10 8D 16 D0 A9 04 8D 49
9C88: 5F 99 4C 60 99 E0 02 D0 7B
9C90: 1A AD 16 D0 29 0F 8D 16 1B
9C98: D0 AD 11 D0 29 9F 09 40 0B
9CA0: 8D 11 D0 A9 04 8D 5F 99 44
9CA8: 4C 60 99 E0 03 D0 20 AD 71
9CB0: 16 D0 29 0F 8D 16 D0 AD F1
9CB8: 11 D0 29 9F 09 20 8D 11 2B
9CC0: D0 AD 18 D0 09 08 8D 18 DE
9CC8: D0 A9 00 8D 22 C0 60 AD C1
9CD0: 16 D0 09 10 8D 16 D0 AD F2
9CD8: 11 D0 29 9F 09 20 8D 11 4B
9CE0: D0 AD 18 D0 09 08 8D 18 FE
9CE8: D0 A9 FF 8D 22 C0 60 00 34
9CF0: A9 00 8D EF 9C 20 82 B7 0F
9CF8: C0 08 F0 03 4C 98 B7 A0 F2
9D00: 00 B1 22 AA B9 2E 9D E0 E4
9D08: 30 F0 0E E0 31 F0 03 4C 89
9D10: 98 B7 18 6D EF 9C 8D EF EF
9D18: 9C C8 C0 08 D0 E3 AD EF 98
9D20: 9C 85 63 A9 00 85 62 A2 D9
9D28: 90 38 20 49 BC 60 80 40 38
9D30: 20 10 08 04 02 01 78 A9 91
9D38: 7F 8D 0D DC A9 01 8D 1A 81
9D40: D0 A9 03 85 FB AD A4 9D 2F
9D48: 8D 12 D0 A9 18 8D 11 D0 E9
9D50: A9 31 8D A2 9D A9 EA 8D 1B
9D58: A3 9D A9 66 8D 14 03 A9 F7
9D60: 9D 8D 15 03 58 60 AD 19 23
9D68: D0 8D 19 D0 29 01 F0 2B F6
9D70: C6 FB 10 04 A9 02 85 FB 74
9D78: A6 FB BD A7 9D 8D 21 D0 9D
9D80: BD AA 9D 8D 11 D0 BD AD 61
9D88: 9D 8D 16 D0 BD B0 9D 8D 34
9D90: 18 D0 BD A4 9D 8D 12 D0 E9
9D98: 8A F0 06 68 A8 68 AA 68 A6
9DA0: 40 4C 31 EA 31 B1 71 02 9F
9DA8: 07 06 5B 1B 1B 08 08 18 6F
9DB0: 14 16 14 20 9E B7 8E A6 9A
9DB8: 9D 20 00 E2 8E A5 9D 20 4B
9DC0: 00 E2 8E A4 9D 20 00 E2 77
9DC8: 8E A9 9D 20 00 E2 8E A8 D8
9DD0: 9D 20 00 E2 8E A7 9D 20 65
9DD8: 00 E2 8E AC 9D 20 00 E2 97
9DE0: 8E AB 9D 20 00 E2 8E AA F4
9DE8: 9D 20 00 E2 8E AF 9D 20 85
9DF0: 00 E2 8E AE 9D 20 00 E2 B1
9DF8: 8E AD 9D 20 00 E2 8E B2 17
9E00: 9D 20 00 E2 8E B1 9D 20 9E
9E08: 00 E2 8E B0 9D 4C 36 9D E7
9E10: 20 9E B7 E0 08 30 03 4C EE
9E18: 48 B2 E0 02 30 07 E0 04 12
9E20: 10 03 4C 48 B2 8A 0A 0A 19
```

IMPORTANT! Letters on white background are **Bug Repellent** line codes. **Do not enter them!** Pages 109 and 110 explain these codes and provide other essential information on entering ***Ahoy!*** programs. Refer to these pages **before** entering any programs!

```
9E28: 0A 85 02 A9 00 85 C1 85 30
9E30: C3 A9 D0 85 C2 A9 80 18 F8
9E38: 65 02 85 C4 AD 0E DC 29 AB
9E40: FE 8D 0E DC A5 01 29 FB 83
9E48: 85 01 A2 00 A0 00 B1 C1 85
9E50: 91 C3 C8 D0 F9 E6 C2 E6 C9
9E58: C4 E8 E0 08 D0 F0 A5 01 57
9E60: 09 04 85 01 AD 0E DC 09 95
9E68: 01 8D 0E DC 60 A9 00 A2 8E
9E70: C0 8D 7A 9E A0 A0 8C 7B 21
9E78: 9E 8D 00 A0 EE 7A 9E D0 1E
9E80: F8 EE 7B 9E EC 7B 9E D0 5A
9E88: F0 60 3F 01 00 00 A0 20 DA
9E90: 8A AD 20 F7 B7 A5 14 8D DF
9E98: 8A 9E A5 15 8D 8B 9E 20 54
9EA0: 00 E2 8E 8C 9E AD 8B 9E 15
9EA8: F0 13 A9 01 8D 8B 9E AD BC
9EB0: 8A 9E 30 04 C9 40 30 05 4D
9EB8: A9 3F 8D 8A 9E AD 8C 9E 31
9EC0: 10 0B 29 7F C9 48 30 05 CB
9EC8: A9 C7 8D 8C 9E AD 8C 9E CB
9ED0: 29 F8 85 C1 A9 00 85 C2 2C
9ED8: A5 C1 18 2A 26 C2 2A 26 BB
9EE0: C2 2A 26 C2 85 C3 A5 C2 68
9EE8: 85 C4 A5 C3 2A 26 C2 2A D9
9EF0: 26 C2 18 65 C3 85 C3 A5 0A
9EF8: C2 65 C4 85 C4 AD 8C 9E 09
9F00: 29 07 18 65 C3 85 C3 A5 60
9F08: C4 69 00 85 C4 AD 8A 9E 57
9F10: 29 F8 18 65 C3 85 C3 AD 6A
9F18: 8B 9E 65 C4 85 C4 AD 8D F1
9F20: 9E 18 65 C3 85 C3 AD 8E 85
9F28: 9E 65 C4 85 C4 AD 8A 9E 12
9F30: 29 07 85 C1 A9 07 38 E5 76
9F38: C1 AA A8 38 A9 00 2A CA 24
9F40: 10 FC 85 C2 A0 00 20 00 56
9F48: E2 E0 01 D0 13 A5 01 29 C0
9F50: FE 85 01 B1 C3 05 C2 91 A4
9F58: C3 A5 01 09 01 85 01 60 B3
9F60: E0 00 F0 13 A5 01 29 FE 14
9F68: 85 01 B1 C3 45 C2 91 C3 C1
9F70: A5 01 09 01 85 01 60 A9 B1
9F78: FF 38 E5 C2 85 C2 A5 01 48
9F80: 29 FE 85 01 B1 C3 25 C2 8C
9F88: 91 C3 A5 01 09 01 85 01 15
9F90: 60 20 15 FD 20 A3 FD 20 06
9F98: 18 E5 20 CC FF A9 00 85 B2
9FA0: 13 20 7A A6 20 00 90 58 FD
9FA8: A9 80 6C 00 03 20 9E B7 B8
9FB0: E0 08 30 03 4C 48 B2 BD D1
9FB8: 02 9A 85 C1 20 00 E2 E0 80
9FC0: 00 F0 0B AD 1B D0 05 C1 1D
9FC8: 8D 1B D0 4C DD 9F A9 FF B5
9FD0: 38 E5 C1 85 C1 AD 1B D0 91
9FD8: 25 C1 8D 1B D0 60 AD 8A D1
9FE0: 02 18 69 80 8D 8A 02 60 5F
9FE8: 00 FF 00 FF 00 FF 00 FF E8
9FF0: 00 F0
```

PERMA-LINE
FROM PAGE 78

```
·10 REM *** PERMA-LINE *** BUCK CHILDRESS
 ***                                         OF
·20 REM *** P.O. BOX 13575 SALEM, OR 9730
9 ***                                        DC
·30 PRINTCHR$(147)"LOADING AND CHECKING D
ATA LINE:":J=52000:L=110:C=11                BD
·40 PRINTCHR$(19)TAB(31)L:PRINT:FORB=0TOC
:READA:IFA<0ORA>255THEN60                    KG
·50 POKEJ+B,A:X=X+A:NEXTB:READA:IFA=XTHEN
70                                           BP
·60 PRINT"ERROR IN DATA LINE:"L:END          HL
·70 X=0:J=J+12:L=L+10:IFL<390THEN40          AO
·80 IFL=390THENC=12:GOTO40                   GC
·90 PRINT"THE DATA IS OK AND LOADED[3"."]
":PRINT                                      GI
·100 PRINT"SYS 52[3"0"] TO ACTIVATE[3"."]
":NEW                                        IK
·110 DATA32,33,204,169,0,162,160,133,251,
134,252,170,1700                             ME
·120 DATA161,251,129,251,230,251,208,248,
230,252,165,252,2628                         IJ
·130 DATA201,192,144,240,173,3,3,201,203,
208,9,169,1746                               PO
·140 DATA131,162,56,160,164,76,136,203,14
2,126,169,169,1694                           GB
·150 DATA76,162,156,160,203,141,108,164,1
42,109,164,140,1725                          EK
·160 DATA110,164,162,187,160,203,141,156,
164,142,157,164,1910                         JG
·170 DATA140,158,164,162,167,160,203,142,
123,168,140,124,1851                         PN
·180 DATA168,162,175,160,203,141,197,168,
142,198,168,140,2022                         NB
·190 DATA199,168,169,147,162,36,160,203,1
41,2,3,140,1530                              IJ
·200 DATA3,3,104,104,76,15,204,32,30,204,
142,124,1041                                 AK
·210 DATA204,76,131,164,173,124,204,208,3
,76,113,164,1640                             LP
·220 DATA76,116,164,169,0,141,124,204,76,
89,166,169,1494                              CI
·230 DATA0,141,124,204,165,95,233,1,76,20
1,168,32,1440                                LM
·240 DATA107,169,165,122,166,123,141,121,
204,142,122,204,1786                         CD
·250 DATA169,255,162,1,133,122,134,123,20
2,134,251,160,1846                           GK
·260 DATA6,32,115,0,176,20,201,48,144,16,
```

```
166,251,1175                                  DF
•270 DATA208,6,201,48,240,239,133,251,136
,240,32,76,1810                               HM
•280 DATA213,203,192,2,176,12,165,251,201
,54,144,6,1619                                CM
•290 DATA165,21,201,234,144,13,173,121,20
4,174,122,204,1776                            IP
•300 DATA133,122,134,123,76,159,164,104,1
04,162,0,189,1470                             IL
•310 DATA44,204,240,7,32,210,255,232,76,1
5,204,76,1595                                 PH
•320 DATA116,164,162,54,44,162,55,120,134
,1,162,47,1221                                GM
•330 DATA134,0,88,96,17,84,72,69,32,77,65
,88,822                                       DL
•340 DATA73,77,85,77,32,76,73,78,69,32,78
,85,835                                       JE
•350 DATA77,66,69,82,32,73,83,32,54,53,53
,51,725                                       AN
•360 DATA53,46,13,0,17,80,69,82,77,65,45,
76,623                                        PP
•370 DATA73,78,69,32,73,83,32,79,78,46,13
,0,656                                        DJ
•380 DATA17,80,69,82,77,65,45,76,73,78,69
,32,763                                       HB
•390 DATA73,83,32,79,70,70,46,13,0,66,85,
67,75,759                                     KG
```

DARK FORTRESS
FROM PAGE 99

```
•10 COLOR0,1:COLOR4,1:FORX=0TO1:PRINTCHR$
(27)CHR$(88)CHR$(147)CHR$(142)CHR$(11):C
OLOR5,15:CHAR1,0,5                            BE
•20 PRINTTAB(4)"  [c A][27"[s C]"][c S]       OD
•30 PRINTTAB(4)"  [s B] D A R K  F O R T
R E S S  [s B]                                MK
•40 PRINTTAB(4)"  [s B][4" "]BY CLEVE BLA
KEMORE[5" "][s B]                             DH
•50 PRINTTAB(4)"  [s B][27" "][s B]           EA
•60 PRINTTAB(4)"  [s B]  [RVSON](C)1986 C
.M.BLAKEMORE [RVSOFF] [SS][SS][s B]           AL
•70 PRINTTAB(4)"  [s B][27" "][s B]           EA
•80 PRINTTAB(4)"  [s B]  DOUBLE SCREEN GA
ME FOR[3" "][s B]                             GI
•90 PRINTTAB(4)"  [s B] C128 REQUIRES 40
& 80 COL [s B]                                IG
•100 PRINTTAB(4)"  [s B]MONITORS AND TWO
JOYSTICKS [s B]                               HD
•110 PRINTTAB(4)"  [c Z][27"[s C]"][c X]      KG
•120 PRINT"[6"[DOWN]"]"TAB(10)" PLEASE ST
AND BY [4"."] ":NEXT                          OJ
•130 DIM A$(69),L$(29),O(29),D(29,6),BO(1
5),M(29),W(18)                                FN
•140 B=1:N=18:TS=1:L(1)=.:L(2)=L(1):H(1)=
10:H(2)=H(1):S(1)=128:S(2)=S(1):T(1)=.:T
(2)=T(1):G(1)=200:G(2)=G(1):P=.:P(1)=1:P
(2)=2:C(1)=21:C(2)=C(1):B(1)=.:B(2)=.         EJ
•150 CD$=CHR$(17):CU$=CHR$(145):HI$="[RVS
ON]":OF$="[RVSOFF]"                           CL
•160 FORX=1TO51:READA$(X):NEXT:FORX=0TO22
:READL$(X):NEXT:READA$:FORX=23TO29:L$(X)
=A$:NEXT:FORX=0TO29:FORJ=1TO6:READD(X,J)
:NEXTJ,X:FORX=0TO14:BO(X)=2[UPARROW]X:NE
XT                                            DJ
•170 FORX=0TO29:READO(X):NEXT:FORX=0TO22:
READM(X):NEXT                                 OE
•180 TR=BO(0)+BO(1)+BO(6)+BO(8)+BO(13):PS
=BO(8)-1                                      KD
•190 PRINTCHR$(147)CHR$(14)CHR$(27)CHR$(8
8)CHR$(147)CHR$(14)CHR$(11)                   OI
•200 REM MAINLOOP                             PK
•210 FORZ=1TO2                                IM
•220 PRINT"[HOME][HOME]"CHR$(7):CHAR1,6,2
4:PRINT"[RVSON] [s P]LEASE WAIT [s P]LAY
ER #";3-Z;                                    AF
•230 PRINTCHR$(27)CHR$(88)CHR$(14)CHR$(11
);:CHAR1,6,24:PRINT"[RVSON]  [s Y]OUR [s
 T]URN  [s P]LAYER #";Z;                      EO
•240 CL=C(Z):L=L(Z):S=S(Z):G=G(Z):H=H(Z):
P=P(Z):T=T(Z):TH=T(Z):H=H+.2                  HD
•250 GOSUB660                                 CI
•260 B=1:N=18:TS=1:GOSUB480                   BD
•270 IFI<7THENGOSUB640:GOTO290                BK
•280 ONI-6GOSUB810,840,890,960,1080,1150,
1280,1390,1520,1670,1730,1860                 DC
•290 IF(M(CL)AND(BO(9)-1))THENBEGIN:ELSE3
80                                            PG
•300 Y=0:FORX=0TO8:IFM(CL)ANDBO(X)THENY=X
+1:NEXT:ELSENEXT                              HH
•310 I=M(CL)ANDBO(9)-1:IFYAND(TH>IOR(TH+T
(3-P)>IANDCL=(3-P)))THENBEGIN:M(CL)=M(CL
)AND(BO(12)+BO(13)+BO(14)):PRINTA$(42+Y)
;" KILLED!":TH=0:H=H+Y:SLEEP6:GOSUB670        HM
•320 I=INT(RND(1)*(Y*50)):G=G+I:PRINT"[s
Y]OU FOUND";I:PRINT"[s G]OLD PIECES!"         OM
•330 IFY=7THENO(CL)=O(CL)ORB(3-P):L=LORB(
Z):GOSUB780:PRINT"[s T]HE BAGWOMAN DROPP
ED ALL HER CONTRABAND.":SLEEP5                BG
•340 Y=0                                      DK
•350 BEND                                     BG
•360 IFYANDY<8ANDRND(1)<.2+Y/10+((LANDBO(
1))*-.1)THENGOSUB780:PRINT"[s C][s R][s
U][s N][s C][s H]!![s S]TRUCK BY ";A$(42
+Y);"!":H=H-Y:IFY=7ANDLANDB(Z)=.THENB(Z)
=B(Z)ORL:L=0                                  II
•370 BEND                                     BG
•380 IFH<=0ANDCLTHENBEGIN:PRINT"[s Y]OU H
AVE [s D][s I][s E][s D][3"."]":IF(M(CL)
AND(BO(7)-1))THENPRINT"[s S][s L][s A][s
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 I][s N] BY THE ";A$(42+Y);"!"              IO
•390 CL=0:Y=0:SLEEP7:GOSUB670:BEND          DC
•400 IFC(Z)<>CLTHENTH=0                     PB
•410 C(Z)=CL:L(Z)=L:S(Z)=S:G(Z)=G:H(Z)=H:
 T(Z)=T:T(Z)=TH                             DD
•420 Y=0                                    DK
•430 NEXT                                   IA
•440 TH=0:GOTO210                           NE
•450 REM **  MENU SUBROUTINE  **            MH
•460 REM RETURNS VALUE CHOSEN IN "I"        EM
•470 REM FIRE BUTTON TO CHOOSE              GE
•480 WINDOW0,5,16,23,1                      DP
•490 PRINTCHR$(19);                         FD
•500 FORI=BTON:PRINTTAB(TS);OF$;A$(I):NEX
 T                                          CD
•510 PRINTCHR$(19);:I=B                     OG
•520 PRINTTAB(TS);HI$;A$(I)                 BB
•530 A$=""                                  GL
•540 J=JOY(P):REM JOYSTICK PORT             GN
•550 IFJAND128THENRETURN                    GJ
•560 IFJ=5THENA$=CD$                        CG
•570 IFJ=1THENA$=CU$                        EJ
•580 IFA$<>CD$ANDA$<>CU$THEN530             KN
•590 PRINTCU$;TAB(TS);OF$;A$(I)             CC
•600 IFA$=CD$THENI=I+1:IFI>NTHEN510         KJ
•610 IFA$=CU$THENPRINTCU$CU$;:I=I-1:IFI<B
 THEN510                                    DM
•620 GOTO520                                CH
•630 REM MOVE                               ME
•640 IFD(CL,I)THENCL=D(CL,I):GOSUB670:TH=
 0:RETURN                                   CE
•650 GOSUB780:PRINT"[s Y]OU CAN'T GO THAT
  WAY!":RETURN                              EM
•660 REM LOCATION                           AO
•670 IF(LANDBO(7))=.ANDCL>5ANDCL<20AND(CL
 <>C(3-P)ORCL=C(3-P)AND(L(3-P)ANDBO(7)=0)
 )THENGOSUB760:PRINT"[s Y]OU CAN'T SEE A
 THING IN THIS DARKNESS!":RETURN            NN
•680 GOSUB760:PRINTHI$;L$(CL):PRINT"[s E]
 [s X][s I][s T][s S]:";:FORX=1TO6:IFD(CL
 ,X)THENPRINTA$(0+X);"[LEFT],";             JK
•690 NEXT:PRINT"[LEFT].";                   KI
•700 GOSUB800:PRINTHI$;"[s Y]OU CAN NOW S
 EE [3"."]":FORX=0TO14:IF(O(CL)ANDBO(X))T
 HENPRINTA$(19+X)                           KP
•710 NEXT                                   IA
•720 FORX=0TO8:IF(M(CL)ANDBO(X))THENPRINT
 "[RVSON][3"*"] [s T]HERE IS A [3"*"] ";C
 HR$(13);HI$;A$(43+X);" HERE!"              HD
•730 NEXT:IFCL=C(3-P)THENPRINT:PRINTHI$;A
 $(40+(3-P));" IS HERE! "                   KE
•740 IFO(CL)=.AND(M(CL)AND(BO(9)-1))=0THE
 NPRINT"[s N]OTHING[4"."]":RETURN:ELSE RE
 TURN                                       JH
•750 REM WINDOW ONE                         EP
•760 WINDOW0,0,39,4,1:RETURN                LE
•770 REM WINDOW ONE W/O CLEAR               IL
•780 WINDOW0,0,39,4,0:CHAR1,0,4:PRINTCHR$
 (27);CHR$(81);:RETURN                      BO
•790 REM WINDOW TWO W/CLEAR                 DG
•800 WINDOW 17,5,39,23,1:RETURN             FD
•810 REM INVENTORY                          HB
•820 GOSUB800:PRINT"[RVSON][s I][s N][s V
 ][s E][s N][s T][s O][s R][s Y]":FORX=0T
 O14:IF(BO(X)ANDL)THENPRINTA$(19+X)         ED
•830 NEXT:PRINTCHR$(13)" [RVSON][s G][s O
 ][s L][s D][RVSOFF]";G:RETURN              BN
•840 REM ATTACK                             FE
•850 GOSUB780:IF(M(CL)AND(BO(9)-1))=.THEN
 PRINT"[s N]OTHING HERE TO ATTACK!":RETUR
 N                                          BB
•860 IF(LANDBO(3)-1)=.THENPRINT"[s Y]OUR
 BARE FISTS ARE INEFFECTIVE[3"."]":RETURN PA
•870 PRINT"[s S]LASH!":IFRND(1)<.2+H/10TH
 ENTH=TH+(LAND(BO(0)+BO(2)))+H/5:PRINT"[s
  Y]OU HIT[3"!"]"                           OF
•880 RETURN                                 IM
•890 REM TAKE                               LI
•900 GOSUB780:IFO(CL)=.THENPRINT"[s N]OTH
 ING HERE!":RETURN                          BN
•910 I=.:FORX=0TO14:IF(LANDBO(X))THENI=I+
 1                                          DL
•920 NEXT:IFI=>4THENPRINT"[s Y]OUR [s L]O
 AD IS TOO HEAVY!":RETURN                   CI
•930 B=52:N=B:FORX=0TO14:IF(O(CL)ANDBO(X)
 )THENA$(N)=A$(19+X):W(N-52)=BO(X):N=N+1  LF
•940 NEXT:A$(N)="[s N]OTHING":W(N-52)=.:G
 OSUB480:I=I-52                             GL
•950 IFLANDW(I)THENGOSUB780:PRINT"[s Y]OU
  ALREADY HAVE ONE,GREEDY!":RETURN:ELSEL=
 (LORW(I)):O(CL)=O(CL)-W(I):GOSUB820:RETU
 RN                                         GJ
•960 REM DROP                               MC
•970 IFL=.THENGOSUB780:PRINT"[s Y]OU ARE'
 NT CARRYING ANYTHING TO DROP!":RETURN      JC
•980 B=52:N=B:GOSUB820:FORX=0TO14:IF(LAND
 BO(X))THENA$(N)=A$(19+X):W(N-52)=BO(X):N
 =N+1                                       BK
•990 NEXT:A$(N)="[s N]OTHING":W(N-52)=.:G
 OSUB480:I=I-52:IFO(CL)ANDW(I)THENGOSUB78
 0:PRINT"[s Y]OU CAN'T DROP THAT HERE.":R
 ETURN:ELSEL=L-W(I):O(CL)=(O(CL)ORW(I)):G
 OSUB820                                    MK
•1000 GOSUB780                              CP
•1010 IFCL=20AND(M(CL)ANDBO(14))=.AND(O(C
 L)AND(BO(3)+BO(4)+BO(5)))=BO(3)+BO(4)+BO
 (5)THENPRINT"[s A]DVENTURER,YOU HAVE CON
 QUERED THE [s D][s A][s R][s K][SS] [s F
 ][s O][s R][s T][s R][s E][s S][s S]!!":
 ELSE RETURN                                PA
•1020 SLEEP6:FORX=1TO2:PRINTCHR$(27);CHR$
 (88);CHR$(19);CHR$(19);:WINDOW0,0,39,24,
 1:CHAR1,0,5                                HI
•1030 PRINT"[RVSON][3"[RIGHT]"][8" "][s P
 ]LAYER #";Z;"[LEFT] [s W]INS [3"!"][8" "
 ]"                                         CF
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•1040 PRINT"[RVSON][3"[DOWN]"][3"[RIGHT]"
 ][8" "][s C][s O][s N][s G][s R][s A][s
 T][s U][s L][s A][s T][s I][s O][s N][s
 S][SS][4"!"][7" "]":PRINT"[3"[DOWN]"][RI
 GHT][RIGHT][s T]HE THREE GEMS ARE IN THE
  TROPHY CASE."                            DO
•1050 PRINT"[DOWN][DOWN][RIGHT][RIGHT][s
 I] HOPE YOU HAVE ENJOYED YOUR QUEST [3".
 "]"                                       EN
•1060 PRINTTAB(15)"[s G][s O][s O][s D][s
  B][s Y][s E]."                           OD
•1070 NEXT:FORX=0TO50:PRINTCHR$(7);:FORI=
 1TO75:NEXTI,X:END                         KC
•1080 REM INCANT                           EJ
•1090 GOSUB780:IFCLANDCL<>15THENPRINT"[s
 Y]OU'RE NOT IN THE RIGHT PLACE FOR AN[4"
 "]INCANTATION[3"."]":RETURN               PP
•1100 IFCL=.ANDRND(1)<.05THENPRINT"[s Y]O
 UR [s D]EITY HAS INTERCEDED FOR YOU.":SL
 EEP6:CL=21:H=10:GOSUB670:RETURN           LJ
•1110 IF(LANDBO(12))=.THENPRINT"[s S]PELL
  FIZZLED.":RETURN                         PH
•1120 IFCL=15THENH=H+25:L=L-BO(12):X=(23+
 (RND(0)*7)):O(X)=O(X)+BO(12):IFC(3-P)=0T
 HENC(3-P)=15                              GL
•1130 IFCL=0THENL=L-BO(12):X=(23+(RND(0)*
 7)):O(X)=O(X)+BO(12):CL=15:H=10:D(0,5)=1
 5                                         NO
•1140 PRINT"[s T]HE RING GLOWS BRIGHTLY A
 ND VANISHES[3"."]":SLEEP5:GOSUB670:RETUR
 N                                         PJ
•1150 REM CAST SPELL                       DM
•1160 IFS=.THENGOSUB780:PRINT"[s S]ORRY[3
 "."][s Y]OUR [s M]AGIC IS ALL GONE.":RET
 URN                                       PN
•1170 B=52:N=B:FORX=0TO7:IF(BO(X)ANDS)THE
 NA$(N)=A$(33+X):W(N-52)=X+1:N=N+1         IB
•1180 NEXT:A$(N)="[s N]O [s S]PELL":W(N-5
 2)=.:GOSUB480:GOSUB780:IFW(I-52)THENS=S-
 BO(W(I-52)-1):ONW(I-52)GOSUB1200,1210,12
 20,1230,1240,1250,1260,1270               BB
•1190 RETURN                               IM
•1200 IFM(CL)ANDRND(1)>.9THENM(CL)=(M(CL)
 -(BO(9)-1)):PRINT"[s F]EAR [s S]PELL CAS
 T[3"."][s B][s O][s O][3"!"]":RETURN:ELS
 EPRINT"[s S]PELL FIZZLED[4"."]":RETURN    AP
•1210 PRINT"[s H]EALING SPELL CAST[3"."]"
 :H=H+10:RETURN                            KD
•1220 TH=TH+100:PRINT"[s Z][s Z][s E][s E
 ][s O][3"[s W]"]!![s M]AGIC [s M]ISSILE
 FIRED!":RETURN                            MF
•1230 TH=TH+500:PRINT"[s Z][s A][s H][s O
 ][s R][4"[s F]"][3"!"][s F][s I][s R][s
 E][s B][s A][s L][s L][SS]FIRED!":RETURN PD
•1240 X=INT(RND(1)*22+1):IFX=10ORX=14ORX=
 19THEN1240:ELSEIFCL<>C(3-P)THENPRINT"[s
 N]O PLAYER HERE!":RETURN:ELSEC(3-P)=X:PR
 INT"[s W]HISSH![s T]RANSPORTED.":SLEEP5:
 GOSUB670:RETURN                           BH
•1250 CL=C(3-P):GOSUB760:GOSUB670:GOSUB78
 0:PRINT"[s T]HE VISION WAVERS FOR A MOME
 NT.";:CL=C(P):SLEEP5:GOSUB760:RETURN      FM
•1260 IFCL=12THENPRINT"[s A] LUMP OF COPP
 ER TRANSMUTES INTO GOLD!":G=G+1000:GOSUB
 820:RETURN                                IJ
•1270 IFCL=.THENCL=21:H=10:GOSUB670:GOSUB
 780:PRINT"[RVSON] [s Y]OU HAVE BEEN [s R
 ][s E][s S][s U][s R][s R][s E][s C][s T
 ][s E][s D]! [RVSOFF]";:RETURN:ELSE PRIN
 T"[s S]PELL [s F]IZZLED!":RETURN          DF
•1280 REM SPEAK                            AP
•1290 GOSUB780:IFCL>5ANDCL<19AND(LANDBO(7
 )=.)THENPRINT"'[s H] [s E] [s L] [s P] [
 3"!"]'":GOTO1330                          MN
•1300 IFCL=13THENPRINT"'[s H][s E][s L][s
  L][s O][3"."][s H]ELLO[3"."]HELLO[3"."]
 '":GOTO1330                               JK
•1310 IFCL=.THENPRINT"'[s I]T'S HOPELESS'
  SAYS ONE OF THE SPIRITS.":GOTO1330       JD
•1320 PRINT"'[s H]ELLO.'"                  GI
•1330 IFM(CL)ANDBO(1)THENPRINT"[s M][s E]
  [s G][s U][s A][s R][s D][SS][s B][s R]
 [s I][s D][s G][s E][3"!"]"               FB
•1340 IFM(CL)ANDBO(5)THENPRINT"[s D][s I]
 [s E],[s K][s N][s A][s V][s E][4"!"]"    ML
•1350 IFM(CL)ANDBO(6)THENPRINT"[s W]ELL,I
 T'S GOOD TO SEE A YOUNG PERSON WITH MANN
 ERS!"                                     CD
•1360 IFM(CL)ANDBO(7)THENPRINT"[s G]OD BL
 ESS,YOUNG FRIEND.[s H]AVE YOU SEEN MY ST
 AFF AROUND?[s I] AM SO SHORT,AND [s I] O
 FTEN  USE IT TO EXTEND MY REACH[3"."]"    DM
•1370 IFM(CL)ANDBO(8)THENPRINT"[s Y]OU'RE
  WELCOME TO WHATEVER [s I] HAVE.[s B]UT[
 3" "]YOU MUST FIND IT,MY GOOD FELLOW."    GP
•1380 RETURN                               IM
•1390 REM LOCK/UNLOCK                      LM
•1400 GOSUB780                             CP
•1410 IFCL=9AND(LANDBO(9))THEND(CL,1)=XOR
 (D(CL,1),10):PRINT"[s C]LICK[4"."]";A$(2
 8):SLEEP3:GOSUB670:RETURN                 CK
•1420 IFCL=18AND(LANDBO(10))THEND(CL,3)=X
 OR(D(CL,3),19):PRINT"[s C]LICK[4"."]";A$
 (29):SLEEP3:GOSUB670:RETURN               AB
•1430 IFCL=2AND(LANDBO(10))THEND(CL,6)=XO
 R(D(CL,6),14):PRINT"[s C]LICK[4"."]";A$(
 29):SLEEP3:GOSUB670:RETURN                JC
•1440 IFCL=3AND(LANDBO(10))THEND(CL,2)=XO
 R(D(CL,2),6):PRINT"[s C]LICK[4"."]";A$(2
 9):SLEEP3:GOSUB670:RETURN                 KA
•1450 IFCL=21AND(M(CL)ANDBO(13))=.THENPRI
 NT"[s T]HE MACHINE DOOR IS OPEN.":SLEEP5
 :GOSUB670:RETURN                          BH
•1460 IFCL=21AND(LANDBO(11))THENO(CL)=O(C
 L)ORBO(4):M(CL)=M(CL)ANDBO(9)-1:PRINT"[s
  C]LICK[3"."][s C]AHCHUNK![s L]OOK WHAT
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THE SOFTDRINK MAN LEFT BEHIND!":SLEEP5:G
OSUB670:RETURN                              GE
•1470 IFCL=20AND(LANDBO(11))THENBEGIN:M(C
L)=XOR(M(CL),BO(14)):PRINT"[s C]LICK[4".
"]";A$(30):SLEEP3                           HP
•1480 IF(M(CL)ANDBO(14))THENPRINT"[s T]RO
PHY CASE CLOSED[3"."]":ELSE PRINT"[s T]R
OPHY CASE OPEN[3"."]"                       EM
•1490 RETURN                                IM
•1500 BEND                                  BG
•1510 IFCL=9ORCL=18ORCL=2ORCL=3ORCL=20ORC
L=21THENPRINT"[s Y]OU DON'T HAVE THE RIG
HT KEY.";CHR$(13);"[s K]EEP [s L]OOKING!
":RETURN:ELSE PRINT"[s U]NLOCK WHAT?!?":
RETURN                                      KK
•1520 REM USE                               IB
•1530 IFL=.THENGOSUB780:PRINT"[s Y]OU ARE
'NT CARRYING ANYTHING TO USE!":RETURN       CM
•1540 B=52:N=B:GOSUB820:FORX=0TO14:IF(LAN
DBO(X))THENA$(N)=A$(19+X):W(N-52)=X+1:N=
N+1                                         JI
•1550 NEXT:A$(N)="[s N]OTHING":W(N-52)=.:
GOSUB480:I=I-52:I=W(I):IFI=.THENRETURN      GJ
•1560 GOSUB780:IFCL=13ANDI=3AND(M(CL)ANDB
O(12))THENPRINT"[s Y]OU HOOKED A BAG OF
GOLD IN THE GRATE !":G=G+1500:M(CL)=M(CL
)-BO(12):RETURN                             CM
•1570 IFCL=13ANDI=3AND(M(CL)ANDBO(12))=.T
HENPRINT"[s T]HE GRATE IS EMPTY[3"."]":R
ETURN                                       LO
•1580 IFCL=12ANDI=14AND(M(CL)ANDBO(13))TH
ENM(CL)=M(CL)-(BO(12)+BO(13)):O(CL)=O(CL
)+BO(9):PRINT"[s Y]OU DUG UP A BAG OF GO
LD!":G=G+500:RETURN                         NO
•1590 IFCL=11ANDI=7THENCL=12:PRINT"[s Y]O
U CLIMBED DOWN THE ROPE TO THE BOTTOM OF
 THE SHAFT,AND PULLED IT DOWN AFTER[3" "
]YOU[3"."]":RETURN                          BH
•1600 IFCL=14ANDI=4AND(M(CL)ANDBO(13))THE
NBEGIN:PRINT"[s T]HE";A$(22);"CUT A NEAT
 HOLE IN THE[6" "]MIRROR.[s Y]OU FOUND A
 BAG OF GOLD.":G=G+1500                     KE
•1610 O(CL)=O(CL)ORBO(11):M(CL)=M(CL)-BO(
12)-BO(13):RETURN:BEND                      LB
•1620 IFCL=14ANDI=4AND(M(CL)ANDBO(13))=.T
HENPRINT"[s T]HE MIRROR ALREADY HAS A HO
LE CUT IN IT.[s S]OMEBODY WAS HERE BEFOR
E YOU[3"."]":RETURN                         GC
•1630 IFCL=17ANDI=9AND(M(CL)ANDBO(12))THE
NPRINT"[s Y]OU FOUND A CACHE OF GOLD IN
THE OYSTER!":M(CL)=M(CL)-BO(12)-BO(13):O
(CL)=O(CL)+BO(5):G=G+1500:RETURN            NI
•1640 IFCL=17ANDI=9AND(M(CL)ANDBO(12))=.T
HENPRINT"[s T]HE [s O]YSTER SHELL HAS AL
READY BEEN PRIED OPEN[4"."]":RETURN         NI
•1650 IFCL=17ANDI=1THENPRINT"[s T]HE [s O
]YSTER SQUIRTED WATER IN YOUR FACE!":RET
URN                                         DC
•1660 PRINT"[s N]O USE FOR";A$(18+I);"HER
E!":RETURN                                  BP
•1670 REM DRINK                             AJ
•1680 GOSUB780                              CP
•1690 IFCL=21THENPRINT"[s P]OP[3"."][s F]
IZZ[3"."][s A][s A]AAH[3"."][s W]HATTA R
EFRESHING  BREAK FROM ALL THIS ADVENTURI
NG!":H=H+0.2:RETURN                         FA
•1700 IFCL=7THENPRINT"[s A][s A]AAH[3"."]
[s W]HATTA REFRESHING  BREAK FROM[3" "]A
LL THIS ADVENTURING!":H=H+0.5:RETURN        KH
•1710 IFCL=17THENPRINT"[s Y]UUCCH..[s T]H
AT STUFF MADE YOU SICK[3"!"]":H=H-5:RETU
RN                                          MM
•1720 PRINT"[s D]RINK WHAT?":RETURN         CO
•1730 REM TRADE                             PJ
•1740 IFCL<>22THENGOSUB780:PRINT"[s Y]OU'
RE NOT AT THE [s T][s R][s A][s D][s I][
s N][s G][SS][s P][s O][s S][s T].":RETU
RN                                          OD
•1750 A$(52)="[s B][s U][s Y] [s E][s Q][
s U][s I][s P][s M][s E][s N][s T]":A$(5
3)="[s B][s U][s Y][SS][s M][s A][s G][s
 I][s C]":A$(54)="[s N][s O][SS][s P][s
U][s R][s C][s H][s A][s S][s E]":B=52:N
=54:GOSUB480:ONI-51GOSUB1760,1810:RETURN KC
•1760 I=.:FORX=0TO14:IF(LANDBO(X))THENI=I
+1                                          DL
•1770 NEXT:IFI=>4THENGOSUB780:PRINT"[s Y]
OUR [s L]OAD IS TOO HEAVY!":RETURN          AJ
•1780 B=52:N=B:FORX=0TO14:IF(TRANDBO(X))T
HENA$(N)=A$(19+X):W(N-52)=BO(X):N=N+1       KH
•1790 NEXT:A$(N)="[s N]OTHING":W(N-52)=.:
GOSUB480:I=I-52                             GL
•1800 IFG<(I+1)*200THENGOSUB780:PRINT"[s
Y]OU DON'T HAVE ENOUGH GOLD.[s S]ORRY!":
RETURN:ELSEL=(LORW(I)):G=G-((I+1)*200):G
OSUB820:RETURN                              JC
•1810 B=52:N=B:FORX=0TO7:IF(PSANDBO(X))TH
ENA$(N)=A$(33+X):W(N-52)=BO(X):N=N+1        KD
•1820 NEXT:A$(N)="[s N]OTHING":W(N-52)=.:
GOSUB480:I=I-52                             GL
•1830 IFG<(I+1)*100THENGOSUB780:PRINT"[s
Y]OU DON'T HAVE ENOUGH GOLD.[s S]ORRY!":
RETURN:ELSES=(SORW(I)):G=G-((I+1)*100):G
OSUB820:RETURN                              GM
•1840 :                                     DI
•1850 REM READ                              LJ
•1860 IFCL=21THENBEGIN:WINDOW0,0,39,24,1    BM
•1870 PRINTTAB(10)"[RVSON] [s D][s A][s R
][s K][SS][s F][s O][s R][s T][s R][s E]
[s S][s S][SS]"                             AP
•1880 PRINT" [s H]ELLO![s W]ELCOME TO [s
D]ARK [s F]ORTRESS![s T]HIS IS AN EXCITI
NG TWO PLAYER,DOUBLE SCREEN[4" "][s A][s
 D][s V][s E][s N][s T][s U][s R][s E] G
AME,BY [s C]LEVE [s B]LAKEMORE,[6" "]ESP
ECIALLY FOR [s A][s H][s O][s Y]!           GB
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·1890 PRINT"[s T]HE OBJECT OF THE GAME IS
 TO AQQUIRE THE THREE PRECIOUS GEMS HIDD
EN INSIDE THE  [s F]ORTRESS AND RETURN T
HEM TO THE TROPHY  CASE DOWNSTAIRS BEFOR
E YOUR"                                    BG
·1900 PRINT"OPPONENT.[s Y]OU WILL ENCOUNT
ER FRIENDS AND FOES,SECRET CAVERNS AND A
WESOME MAGIC[3" "]INSIDE THE [s D][s A][
s R][s K][SS][s F][s O][s R][s T][s R][s
 E][s S][s S].[s R]EMEMBER YOUR  OPPONEN
T IS ALSO STRUGGLING"                      AN
·1910 PRINT"AGAINST YOU,BUT YOU MAY HAVE
TO[9" "]COOPERATE OR EVEN TEAM UP IN ORD
ER TO[3" "]OVERCOME CERTAIN OBSTACLES."    FF
·1920 PRINT"[s B]E COURAGEOUS,USE YOUR HE
AD,AND NEVER[3" "]GIVE UP.[s G]OOD LUCK
TO BOTH OF YOU,AND MAY THE BEST MAN WIN!
[s I] OPERATE THE TRADING BOOTH NEXT DOO
R,AND [s I]"                               CL
·1930 PRINT"SELL [s A]DVENTURER'S SUPPLIE
S,AS WELL AS AN OCCASIONAL BIT OF MAGIC.
[s D]ROP IN WHEN[3" "]YOU GET SOME GOLD.
"                                          GI
·1940 PRINTTAB(10)"[RVSON]  [s C]LEVE [s
B]LAKEMORE  ":SLEEP15                      NJ
·1950 RETURN                               IM
·1960 BEND                                 BG
·1970 GOSUB780:IFCL=9THENPRINT"[RVSON] [s
 R][s E][s Q][s U][s I][s E][s S][s C][s
 A][s T][SS][s I][s N][SS][s P][s A][s C
][s E] ":RETURN                            DP
·1980 IFCL=.THENPRINT"[RVSON]--[s A][s B]
[s A][s N][s D][s O][s N][SS][s A][s L][
s L] [s H][s O][s P][s E],[s Y][s E][SS]
[s W][s H][s O][SS][s E][s N][s T][s E][
s R][SS][s H][s E][s R][s E]--":RETURN     GN
·1990 IFCL=19THENPRINT"[s T]HERE IS SOME
GRAFFITI HERE ON THE WALL-'[s C][s H][s
E][s C][s K][SS][s T][s H][s E][SS][s S]
[s O][s D][s A] [s M][s A][s C][s H][s I
][s N][s E]'":RETURN                       KB
·2000 IFCL=14THENPRINT"[s M]IRROR,MIRROR
ON THE WALL[3"."]":RETURN                  ID
·2010 IFCL=3THENPRINT"[RVSON] * [s N][s O
] [s T][s R][s E][s S][s P][s A][s S][s
S][s I][s N][s G]! * ":RETURN              FC
·2020 IFCL=8THENPRINT"HETAY RISONERSAY AV
EHAY AAY ECRETSAY[4" "]ASSAGEWAYPAY[3"."
]"                                         BL
·2030 IFCL=20THENPRINT"[RVSON] [s U][s N]
[s L][s O][s C][s K][SS][s C][s A][s S][
s E][SS][s W][s I][s T][s H][SS][s S][s
I][s L][s V][s E][s R][SS][s K][s E][s Y
] ":RETURN                                 BA
·2040 IFCL=22THENPRINT"[RVSON][s I][s F][
SS][s Y][s O][s U] [s G][s O][s T][SS][s
 T][s H][s E][SS][s C][s A][s S][s H],[s
 W][s E] [s G][s O][s T] [s T][s H][s E]
[SS][s S][s T][s A][s S][s H]![RVSOFF]":
RETURN                                     AJ
·2050 IFCL=15THENPRINT"[s Y]OU CAN'T UNDE
RSTAND THE HIEROGLYPHS,BUT IF [s I] TOOK
 A WILD GUESS [s I] WOULD SAY[5" "]THERE
 WAS SOME REFERENCE TO A RING OF[3" "]PO
WER[3"."]":RETURN                          LP
·2060 PRINT"[s R]EAD [s W]HAT?!?":RETURN   LF
·2070 DATA " [s N]ORTH "," [s S]OUTH ","
[s E]AST "," [s W]EST "," [s U]P "," [s
D]OWN "," [s I]NVENTORY "                  LA
·2080 DATA " [s A]TTACK "," [s T]AKE ","
[s D]ROP "," [s I]NCANT "," [s C]AST [s
S]PELL "," [s S]PEAK "                     JI
·2090 DATA " [s L]OCK/[s U]NLOCK "," [s U
]SE "," [s D]RINK "," [s T]RADE "," [s R
]EAD "                                     DE
·2100 DATA " [s S]WORD "," [s S]HIELD ","
 [s S]TAFF "," [s D]IAMOND "," [s E]MERA
LD "," [s P]EARL "," [s R]OPE "," [s L]A
NTERN "                                    NB
·2110 DATA " [s C]ROWBAR "," [s C]OPPER [
s K]EY "," [s I]RON [s K]EY "," [s S]ILV
ER [s K]EY "," [s G]OMAR'S [s R]ING ","[
SS][s S]HOVEL "                            OG
·2120 DATA"[s S]PELL OF [s F]EAR","[s H]E
ALING [s S]PELL","[s M]AGIC [s M]ISSILE"
,"[s F][s I][s R][s E][s B][s A][s L][s
L]","[s T]RANSPORTATION","[s C]LAIRVOYAN
CE","[s T]RANSMUTATION","[s R]ESURRECTIO
N"                                         JO
·2130 DATA "[s P]LAYER #1","[s P]LAYER #2
"," [s G]IANT [s S]PIDER"," [s H]ORRID [
s T]ROLL"," [s S]NARLING [s R]AT","[s E]
VIL [s S]ORCERER"                          EF
·2140 DATA "[s G]RIMACING[SS][s O]RC"," [
s B]LACK [s K]NIGHT"," [s O]LD [s B]AGWO
MAN"," [s H]OODED [s M]ONK "," [s W]HITE
 [s R]ABBIT"                               CC
·2150 REM LOCATIONS                        IH
·2160 DATA"[s Y]OU ARE IN THE [s L]AND OF
 [s H]ADES.[s T]HERE IS NO WAY OUT.[s L]
OST [s A]DVENTURERS' SPIRITS ROAM ENDLES
SLY AROUND YOU,MOANING THEIR FATE."        LO
·2170 DATA"[s Y]OU'RE IN [s S]HADOW[s T]H
ORN [s W]OODS.[s T]HE BRUSH IS THICK AND
 TANGLED,WITH PATHS GOING OFF IN VARIOUS
 DIRECTIONS."                              DI
·2180 DATA"[s Y]OU'RE BY THE [s R]ABBIT'S
 [s H]OME.[s A] GNARLED[3" "]HICKORY-STU
MP DOOR IS SEALED IN THE SIDE OF A GRAVE
LLY BURROW NESTLED IN SOME[3" "]BRAMBLES
."                                         JP
·2190 DATA"[s Y]OU'RE ON THE BRIDGE ACROS
S THE [s C]HASM.  [s T]HE [s D]ARK [s F]
ORTRESS TOWERS OVERHEAD,IT'S  MASSIVE ST
EEL PLATED DOORS SET WITH A[3" "]SOLID L
OOKING LOCK."                              OJ
```

```
2200 DATA"[s Y]OU'RE AT THE LOWER PLATEA
U OF THE [s C]HASM BEYOND THE WOODS.[s A
] SHEER CANYON WALL[3" "]IS ON THE OTHER
 SIDE OF THE RIVER."                     OK
2210 DATA"[s Y]OU'RE UPSTREAM OF [s S]HA
DOW[s T]HORN [s C]HASM,THE DEEP AND MIST
Y GORGE THAT SURROUNDS THE [s D]ARK [s F
]ORTRESS[3"."]"                          PF
2220 DATA"[s Y]OU'RE IN THE [s H]ALL OF
[s R]ULERS,A LONG[5" "]MUSTY PASSAGE RUN
NING [s E]-[s W],WITH EXITS IN MANY DIRE
CTIONS."                                 PN
2230 DATA"[s Y]OU'RE AT [s S]TATUE INTER
SECTION,BY AN OLD BLUE GRANITE FOUNTAIN.
[s C]LEAR WATER POURS FROM AN ORNATE STO
NE ANGEL'S UPHELD JAR INTO A MOTTLED BAS
IN."                                     OL
2240 DATA"[s Y]OU'RE IN [s L]IBRARY.[s A
] MASSIVE,ANCIENT TOME RESTS OPEN ON A P
EDESTAL NEARBY,[7" "]INSCRIBED WITH STRA
NGE SCRIPT IN AN[5" "]UNKNOWN TONGUE[3".
"]"                                      PH
2250 DATA"[s Y]OU'RE IN [s M]ONK'S [s R]
ETREAT,A SECRET [s N]-[s S][3" "]TUNNEL
SLANTING UPWARD,ENDING AT A LARGE GRANIT
E SLAB.[s T]HE SLAB HAS A MITRED[5" "]CR
USTY COPPER PLATE ON IT."                HL
2260 DATA"[s Y]OU'RE IN THE [s C]RYPT OF
 [s K]INGS,A COBWEBBY TOMB LITTERED WITH
 SKELETAL REMAINS,THE FINAL RESTING PLAC
E OF THE GREAT WARRIOR [s K]ING [s G]OMA
R."                                      JH
2270 DATA"[s Y]OU'RE ABOVE THE [s S]HIFT
ING [s S]HAFT,A DEEP  PIT THAT TWISTS OD
DLY AS IT GOES DOWN.  [s I]T IS PERHAPS
50-60 FEET TO THE MOSSY[3" "]FLOOR BELOW
."                                       HP
2280 DATA"[s Y]OU'RE IN THE [s C]OPPER [
s M]INES BENEATH THE  [s F]ORTRESS.[s M]
OUNDS OF COPPER ORE PILINGS[3" "]SURROUN
D YOU,AND A DARK TRESTLED SHAFT  LEADS E
AST[3"."]"                               AH
2290 DATA"[s Y]OU'RE IN A [s L]IMESTONE
[s C]AVERN FILLED WITH ELEGANT STALACTIT
E SCULPTURE.[s T]HERE IS  AN IRON GRATE
SET INTO THE FLOOR OVER A PIT FILLED WIT
H RUBBISH."                              FN
2300 DATA"[s Y]OU'RE IN THE [s R]ABBIT'S
 [s B]URROW.[s T]HERE IS  AN OAK TABLE A
ND A[SS]LARGE GLASS MIRROR ON  THE SOUTH
 WALL.[s T]HERE IS SOMETHING[5" "]CARVED
 ON THE WOOD TABLE."                     BP
2310 DATA"[s Y]OU'RE IN THE [s S]ORCERER
'S [s D]EN,A LARGE[4" "]CAVE STREWN WITH
 HIEROGLYPHICS AND MAGIC PAINTINGS."     MI
2320 DATA"[s Y]OU'RE IN A SLOPING [s E]-
[s W] PASSAGE THAT[4" "]WINDS BENEATH A
SHAFT IN THE CEILING."                   MB
2330 DATA"[s Y]OU'RE AT THE [s S]UBTERRA
NEAN [s C]REEK,A COLD AND SLUGGISH POOL
EMERGING FROM A CRACK IN THE SOUTH WALL.
[s A] LARGE OYSTER IS HALF SUBMERGED IN
THE WATER."                              KP
2340 DATA"[s Y]OU'RE IN THE [s T]ORTURER
'S [s D]UNGEON.[s T]HERE  IS AN EMPTY CE
LL HERE FILLED WITH RATS  AND RUBBISH."  DI
2350 DATA"[s Y]OU'RE IN THE [s P]RISONER
'S [s E]SCAPE [s T]UNNEL,  A VAST ANTECH
AMBER CONNECTING TO A[5" "]NORTHERN TUNN
EL."                                     JM
2360 DATA"[s Y]OU'RE IN THE [s T]ROPHY [
s R]OOM.[s A] LARGE[7" "]GLASS CASE,ILLU
MINATED WITH FLOURESCENT LIGHTS,SITS AGA
INST THE NORTH WALL."                    FM
2370 DATA"[s Y]OU'RE IN THE [s A]DVENTUR
ER'S LOUNGE.[s T]HERE IS A [s C]OKE [s M
]ACHINE HERE,AND A SET OF[5" "]LAMINATED
 INSTRUCTIONS TAPED TO THE EAST WALL."   KK
2380 DATA"[s Y]OU'RE AT THE [s A]DVENTUR
ER'S [s T]RADING [s P]OST.[s A] VERY SER
IOUS LOOKING YOUNG MAN SITS[3" "]BEHIND
A GLASS WINDOW IN A BOOTH HERE,  WEARING
 A NAMETAG-'[s C].[s M].[s B].'"         FI
2390 DATA"[s Y]OU'RE DEEP IN THE [s S]HA
DOW[s T]HORN [s H]EDGE[4" "][s M]AZE.[s
H]IGH WALLS OF THICK,THORNY BUSHES  PARA
LLEL YOUR PATH.[s T]URNS AND TWISTS LEAD
 IN EVERY DIRECTION[3"."]"               MB
2400 REM DIRECTIONS                      KH
2410 REM N,S,E,W,U,D                     IM
2420 DATA0,0,0,0,0,0                     JC
2430 DATA28,3,2,5,0,0                    KH
2440 DATA0,4,0,1,0,0                     IN
2450 DATA1,0,4,5,5,0                     KD
2460 DATA2,0,0,3,3,0                     IA
2470 DATA1,0,3,1,0,3                     LC
2480 DATA3,7,8,6,0,0                     LA
2490 DATA6,11,0,6,0,0                    MN
2500 DATA6,0,9,6,0,0                     LL
2510 DATA0,0,0,8,0,0                     JK
2520 DATA0,9,17,0,0,0                    NG
2530 DATA7,0,6,0,6,0                     LF
2540 DATA0,0,13,0,0,0                    MP
2550 DATA0,0,15,12,0.0                   AE
2560 DATA0,0,11,0,2,0                    KH
2570 DATA16,0,0,13,0,0                   PK
2580 DATA0,15,18,11,0,18                 FE
2590 DATA0,0,0,10,0,0                    NG
2600 DATA0,0,0,0,16,0                    NC
2610 DATA1,0,0,18,0,0                    KH
2620 DATA0,0,0,0,21,0                    MC
2630 DATA0,0,0,22,0,20                   PF
2640 DATA0,23,21,0,0,0                   NH
2650 DATA 22,23,24,26,0,0                KF
2660 DATA 0,0,24,25,24,0                 EA
2670 DATA 26,25,27,0,0,0                 DF
```

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•2680 DATA 0,25,0,26,26,0                    GM
•2690 DATA 24,29,24,0,0,23                   HM
•2700 DATA 26,28,29,1,0,0                    GN
•2710 DATA 25,27,0,29,0,28                   LL
•2720 REM OBJECTS                            LK
•2730 DATA 512,0,0,0,64,0,0,0,0,0,4100,0,
0,0,0,0,0,0,0,8,0,0,0,128,0,1024;0,128,0
,1024                                        AP
•2740 REM MONSTERS & FLAGS                   PO
•2750 DATA 0,1,0,2,0,0,32,0,64,128,32,0,1
2288,12288,12544,8,128,12288,4,16,16384,
12288,0                                      IB
```

VORTEX

FROM PAGE 20

Starting address in hex: C000
Ending address in hex: C7E0
SYS to start: 49152

Flankspeed **required for entry! See page 111.**

See page 111.

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C000: 4C DA C6 20 CC C3 A2 F2 34
C008: A0 00 C8 D0 FD E8 D0 F8 F2
C010: A9 00 8D 08 D4 A9 51 8D AC
C018: 0B D4 20 F0 C1 20 59 C4 09
C020: 4C 56 C5 AD 8D 02 F0 DB 92
C028: D0 F9 09 42 24 32 5A 62 51
C030: 12 3A 80 40 20 10 08 04 79
C038: 02 01 02 03 29 05 50 07 C5
C040: 78 07 A0 07 C9 05 F2 03 2C
C048: 9F 11 11 11 11 20 20 20 8C
C050: 20 20 20 20 20 20 20 20 51
C058: 20 20 3E 3E 20 55 4F 52 2C
C060: 54 45 58 20 3C 3C 0D 11 09
C068: 9E 20 20 20 20 20 20 46 0E
C070: 31 20 3D 20 4E 4F 56 49 5C
C078: 43 45 20 20 20 46 33 20 FA
C080: 3D 20 45 58 50 45 52 54 B7
C088: 20 20 20 20 20 20 20 53 BC
C090: 43 4F 52 45 3A 20 30 30 75
C098: 30 30 30 30 30 20 20 4C 16
C0A0: 45 56 45 4C 3A 20 30 31 89
C0A8: 05 1E 0D 0E 05 02 0D 12 0D
C0B0: 00 00 09 09 09 09 0A 1C FA
C0B8: 00 00 09 17 09 17 0A 04 07
C0C0: FF FF FF FF 07 0C 0E 1E FF
C0C8: 07 14 0E 02 04 0A 07 18 21
C0D0: FF FF FF FF 06 10 0C 00 F2
C0D8: FF FF FF FF 09 10 11 00 03
C0E0: 09 15 11 05 09 19 0F 09 4F
C0E8: 09 1C 11 0C FF FF FF FF 2B
C0F0: A9 20 85 FD A9 00 85 FC 6A
C0F8: A8 AA 91 FC C8 D0 FB E8 59
C100: E6 FD E0 20 D0 F4 86 FD 30
C108: A2 00 8A 86 FF A8 84 FE E7
C110: B9 A8 C0 85 B0 B9 A9 C0 8D
C118: 85 B1 30 36 18 8A 65 B1 6F
C120: 29 1F 85 B1 A9 0B 85 AE 88
C128: 85 AF A9 00 85 02 85 B2 C6
C130: 85 B3 20 77 C1 B9 AA C0 E7
C138: 85 B0 B9 AB C0 85 B1 8A 56
C140: 18 65 B1 29 1F 85 B1 E6 D5
C148: 02 20 77 C1 C8 C8 C8 C8 C6
C150: D0 BE 18 A5 FC 69 40 85 C9
C158: FC 90 02 E6 FD 84 8B A4 81
C160: FE E8 E0 20 D0 AA A5 8B F5
C168: 18 69 04 A8 E6 FF A5 FF 23
C170: A2 00 C9 04 D0 98 60 84 2F
C178: 8E 86 8F A4 B1 A6 B0 B9 84
C180: 10 C8 10 0E 18 B9 D0 C7 E1
C188: 65 B3 85 B3 90 10 E6 AF 12
C190: D0 0C 38 A5 B3 F9 D0 C7 91
C198: 85 B3 B0 02 C6 AF B9 30 E4
C1A0: C8 30 0E 18 B9 F0 C7 65 97
C1A8: B2 85 B2 90 10 E6 AE D0 9A
C1B0: 0C 38 A5 B2 F9 F0 C7 85 85
C1B8: B2 B0 02 C6 AE A5 02 F0 2C
C1C0: 25 8A 48 98 48 A5 AF 0A F8
C1C8: 18 65 AF 85 8B A5 AE 29 84
C1D0: 07 AA A5 AE 4A 4A 4A 18 CD
C1D8: 65 8B A8 BD 32 C0 11 FC 31
C1E0: 91 FC 68 A8 68 AA CA E0 3F
C1E8: FF D0 94 A6 8F A4 8E 60 18
C1F0: A2 00 A0 01 BD 00 10 C9 CC
C1F8: B8 90 01 C8 C9 07 B0 01 8E
C200: C8 AD 09 10 C9 08 B0 06 18
C208: A9 00 8D 41 10 EA C0 01 3D
C210: F0 06 A0 00 98 9D 40 10 2E
C218: E0 02 B0 07 A9 02 8D 40 2C
C220: 10 D0 26 BD 40 10 F0 21 47
C228: BD 30 10 C9 0A 90 1A A5 4A
C230: A2 BC F8 07 29 03 F0 01 AD
C238: 88 A9 00 9D 30 10 98 29 0A
C240: 9F 09 80 9D F8 07 20 CE F5
C248: C2 86 FF BC 38 10 98 FE 2E
C250: 30 10 20 A9 C2 8A 18 69 29
C258: 08 AA 20 A9 C2 A6 FF 88 C6
C260: C0 FF D0 EB E8 E0 08 D0 80
C268: 89 A9 00 85 FE 85 FF AA 50
C270: A8 A9 01 85 FC BD 40 10 54
C278: F0 06 A5 FC 05 FE 85 FE 9A
C280: BD 00 10 0A 99 00 D0 90 53
C288: 06 A5 FC 05 FF 85 FF BD 79
C290: 08 10 99 01 D0 06 FC E8 FF
C298: C8 C8 E0 08 90 D7 A5 FE 20
C2A0: 8D 15 D0 A5 FF 8D 10 D0 28
C2A8: 60 BD 50 10 30 10 18 BD 3D
C2B0: 10 10 7D 20 10 9D 20 10 4C
C2B8: 90 03 FE 00 10 60 38 BD B1
C2C0: 20 10 FD 10 10 9D 20 10 DC
C2C8: B0 03 DE 00 10 60 BD F8 82
C2D0: 07 29 1F A8 B9 D0 C7 9D B8
C2D8: 18 10 B9 10 C8 49 80 9D FA
C2E0: 58 10 B9 F0 C7 4A 9D 10 B3
C2E8: 10 B9 30 C8 9D 50 10 60 0A
C2F0: A2 00 8A 9D 00 D4 9D 80 AE
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C2F8: 03 9D 00 10 E8 E0 80 D0 C4
C300: F2 AA E9 08 9D 60 10 E8 86
C308: E0 08 90 F6 A9 93 20 D2 A8
C310: FF A9 00 8D 21 D0 A9 0B ED
C318: 8D 20 D0 A2 00 BD 3A C0 F1
C320: 85 FE A8 18 BD 3B C0 65 84
C328: FE 85 FF A9 A0 99 50 05 E5
C330: AD 40 03 99 50 D9 C8 C4 72
C338: FF D0 F0 E8 E8 E0 0E D0 8B
C340: DC A9 51 8D CB 05 A9 3E 5E
C348: 8D 00 10 A9 D8 8D 08 10 0E
C350: A9 B0 8D F8 07 A9 1B 8D 8A
C358: 11 D0 A9 7F 8D 0D DC A9 84
C360: C6 8D 15 03 A9 5D 8D 14 75
C368: 03 A9 81 8D 1A D0 AD 41 FD
C370: 03 A0 07 C9 07 90 02 A0 1F
C378: 0F 8C 42 03 A9 0F 8D 18 B7
C380: D4 A9 F0 8D 06 D4 A9 B0 B2
C388: 8D 0D D4 A9 51 8D 0B D4 60
C390: 8D 04 D4 AD 41 03 0A 0A FC
C398: 0A 8D 07 D4 A9 01 8D 27 6B
C3A0: D0 A9 0E 8D 28 D0 A9 98 F1
C3A8: 20 D2 FF AD 41 03 A2 30 60
C3B0: C9 0A 90 03 E8 E9 0A 8E 83
C3B8: A6 C0 18 69 30 8D A7 C0 C7
C3C0: 29 07 AA BD 2A C0 85 AA 74
C3C8: AD 1F D0 60 A2 00 8E 02 F9
C3D0: DC AC F8 07 AD 00 DC 29 0E
C3D8: 10 D0 3E AD 41 10 D0 36 FD
C3E0: EE 41 10 AD 00 10 8D 01 6D
C3E8: 10 AD 08 10 8D 09 10 EE 54
C3F0: 80 03 A2 01 AD F8 07 18 DD
C3F8: 69 20 8D F9 07 20 CE C2 C2
C400: EE 41 10 A9 07 8D 39 10 C7
C408: A5 17 C9 20 B0 0B A9 20 34
C410: 85 17 A9 02 85 15 EE 81 63
C418: 03 AD 00 DC 29 04 D0 02 A5
C420: EA C8 AD 00 DC 29 08 D0 60
C428: 02 EA 88 CA 8E 02 DC 98 6E
C430: 29 1F 09 A0 8D F8 07 E8 98
C438: 20 CE C2 AD 81 03 F0 06 13
C440: 8E 10 10 8E 18 10 8E 81 B5
C448: 03 E8 E8 8E 38 10 A9 02 9F
C450: 8D 40 10 AD 1F D0 85 AD FE
C458: 60 A2 02 BD 40 10 D0 3A 76
C460: FE 40 10 A9 55 9D 00 10 5C
C468: A9 85 9D 08 10 A9 09 9D 9D
C470: 30 10 86 AF 20 97 E0 A6 26
C478: AF A5 8E 29 1F 09 80 9D CB
C480: F8 07 A5 8F 2D 42 03 4A 72
C488: CD 41 03 B0 E5 9D 38 10 17
C490: A5 8E 29 07 18 69 03 9D 17
C498: 27 D0 E8 E0 08 D0 BC F0 E0
C4A0: 01 60 AD 41 10 F0 FA AD 9A
C4A8: 09 10 38 E9 18 4A 4A 4A DA
C4B0: A8 A9 03 85 AF A9 D8 85 43
C4B8: AE 18 A5 AE 69 28 85 AE 99
C4C0: 90 02 E6 AF 88 C0 01 D0 05
C4C8: F0 AD 01 10 E9 07 4A 4A FD
C4D0: A8 B1 AE C9 40 90 2A A5 44
C4D8: AF C9 07 B0 24 A9 00 8D 65
C4E0: 81 03 8D 41 10 84 B0 20 99
C4E8: 97 E0 A4 B0 A5 8E 25 AB BB
C4F0: D0 0F A9 20 91 AE A9 FC 81
C4F8: 85 17 A5 AA 85 15 EE 74 E3
C500: 03 AD 41 10 F0 30 A2 02 C7
C508: BD 40 10 F0 24 BD 00 10 F8
C510: 85 FC BD 08 10 85 FD AD 99
C518: 01 10 85 FE AD 09 10 85 F9
C520: FF 20 37 C5 90 0B EE 75 3D
C528: 03 A9 00 8D 41 10 DE 40 D2
C530: 10 E8 E0 08 D0 D2 60 A5 BB
C538: FC 69 04 C5 FE 90 15 E9 F6
C540: 08 C5 FE B0 0F A5 FD E9 5A
C548: 0D C5 FF B0 07 69 16 C5 18
C550: FF 90 01 60 18 60 A9 13 77
C558: 20 D2 FF A2 06 BD 6F 03 24
C560: C9 0A 90 0A E9 0A 9D 6F CF
C568: 03 FE 6E 03 D0 EF 69 30 36
C570: 9D 96 C0 CA D0 E7 AD CB 62
C578: 05 C9 21 B0 51 A9 02 8D A3
C580: 17 D0 8D 1D D0 A9 51 85 64
C588: FE A9 76 85 FF A9 00 85 5C
C590: 14 85 AD 20 7B C6 A9 00 E3
C598: 8D 17 D0 8D 1D D0 AD 41 78
C5A0: 03 A6 AB F0 01 0A 18 6D 77
C5A8: 73 03 8D 73 03 AE 41 03 16
C5B0: E8 E0 13 90 02 A2 01 8E 52
C5B8: 41 03 AE 40 03 E8 8A 29 8B
C5C0: 0F D0 02 A9 01 8D 40 03 1E
C5C8: 20 F0 C2 4C 03 C0 A5 AD FF
C5D0: 29 01 F0 07 AD 08 10 C9 82
C5D8: 48 B0 23 AD CB D9 45 A1 2F
C5E0: 8D CB D9 A2 02 AD 00 10 76
C5E8: 85 FC AD 08 10 85 FD BD 72
C5F0: 00 10 85 FE BD 08 10 85 E0
C5F8: FF 20 37 C5 90 23 AD 00 77
C600: 10 85 FE AD 08 10 85 FF DF
C608: 20 7B C6 EE 43 03 AD 1F 6C
C610: D0 AD 43 03 C9 03 D0 03 75
C618: 4C E0 C6 20 F0 C2 4C 03 2F
C620: C0 E8 E0 08 D0 BF A2 00 E5
C628: BD 00 0D 2A 90 02 09 01 B9
C630: 9D 00 0D E8 E0 08 D0 F0 6E
C638: A2 00 BD 88 C0 20 D2 FF D4
C640: E8 E0 20 D0 F5 AD 00 10 AE
C648: C9 02 B0 02 A9 B4 8D 00 B2
C650: 10 C9 B6 90 02 A9 02 8D AC
C658: 00 10 4C 23 C0 A9 01 8D D0
C660: 19 D0 A5 17 F0 03 38 E5 19
C668: 15 8D 01 D4 85 17 AD 0D 38
C670: DC 29 01 F0 03 4C 31 EA D3
C678: 4C BC FE A9 00 8D 07 D4 93
C680: A9 81 8D 04 D4 A9 00 85 41
C688: 15 8D 10 D0 20 97 E0 A5 4A
C690: 8E 8D 28 D0 29 0F F0 F4 C3
```

IMPORTANT! Letters on white background are **Bug Repellent** line codes. **Do not enter them!** Pages 109 and 110 explain these codes and provide other essential information on entering ***Ahoy!*** programs. Refer to these pages **before** entering any programs!

```
C698: A9 02 8D 15 D0 A5 FE 18 74
C6A0: 0A 8D 02 D0 90 05 A9 02 4C
C6A8: 8D 10 D0 A5 FF 8D 03 D0 1E
C6B0: A9 06 85 17 A0 00 A2 00 40
C6B8: A5 A2 18 69 01 29 1F 49 15
C6C0: E0 8D F9 07 A5 14 D0 03 BD
C6C8: EE 20 D0 CA D0 EA 88 D0 88
C6D0: E5 A9 02 85 15 85 17 85 1F
C6D8: 14 60 20 96 C7 20 F0 C0 9D
C6E0: A2 00 86 17 8E 15 D0 8E 24
C6E8: 21 D0 8E 01 D4 CA 8E 02 9A
C6F0: DC A9 13 AE 3C 03 D0 05 4E
C6F8: A9 93 EE 3C 03 20 D2 FF 57
C700: A2 00 BD 48 C0 20 D2 FF 5C
C708: E8 E0 40 D0 F5 A5 CB A2 EC
C710: 00 C9 04 F0 08 A2 03 C9 46
C718: 05 F0 02 D0 F0 86 AB AD B1
C720: 8D 02 F0 10 AD 20 C4 49 8C
C728: 22 8D 20 C4 AD 29 C4 49 A1
C730: 62 8D 29 C4 A9 00 8D 0E 53
C738: DC A9 33 85 01 A0 00 B9 D2
C740: 00 D0 99 00 08 B9 00 D1 3E
C748: 99 00 09 B9 00 D2 99 00 11
C750: 0A B9 00 D3 99 00 0F C8 59
C758: D0 E5 A9 37 85 01 A9 01 21
C760: 8D 0E DC A2 00 A9 CF 9D 92
C768: 00 0D 2A 90 02 09 01 E8 25
C770: E0 08 D0 F3 A9 12 8D 18 7F
C778: D0 A2 00 86 AD 8A 9D 40 88
C780: 03 E8 E0 40 D0 F8 85 17 F3
C788: EE 41 03 A9 02 8D 40 03 38
C790: 20 F0 C2 4C 03 C0 A2 00 17
C798: 8A 9D E0 C7 E8 E0 80 D0 84
C7A0: F8 AA BD D0 C7 9D E0 C7 E0
C7A8: 9D F8 C7 9D 08 C8 BD D8 0C
C7B0: C7 9D E8 C7 9D F0 C7 9D BA
C7B8: 00 C8 A9 81 9D 20 C8 9D D0
C7C0: 28 C8 9D 38 C8 9D 40 C8 F6
C7C8: E8 E0 08 D0 D5 60 EA EA 77
C7D0: 00 31 61 8E B5 D4 EC FB 65
C7D8: FF FB EC D4 B4 8E 61 31 6C
C7E0: 00 E0
```

LIXTER

FROM PAGE 98

```
·100 DIM KW$(255),HX$(255),CD$(255),OP$(2
 55),AR(255)                                IJ
·110 BL=8:BK=0:POKE53281,BK:POKE53280,PEE
 K(BK)                                      CM
·120 PRINT"[CLEAR][CNTRL N][6"[DOWN]"][6"
 [RIGHT]"]  [s P]LEASE WAIT ONE MOMENT[3"
 ."]"                                       DM
·130 FORX=0TO255:READHX$(X),OP$(X),AR(X):
 NEXT                                       PA
·140 FORX=128TO202:READKW$(X):NEXT          DH
·150 FORX=0TO160:READCD$(X):NEXT:GOSUB 44
 20                                         MP
·160 FORX=32TO95:KW$(X)=CD$(X):NEXT:KW$(2
 55)="[PI]"                                 HP
·180 OF$=F$:PRINT"[CLEAR][c 8][15" "][s L
 ]IXTER[CNTRL N]":PRINT:PRINT:PRINT         GO
·190 INPUT"[s E]NTER [s F]ILENAME--";F$     EO
·200 IFF$=""ORF$="."THENPRINT"[s O].[s K]
 . [s R]EADY.":END                          MJ
·209 IFF$="$"THEN300                        FE
·210 IFOF$=F$THEN 240                       KK
·220 PRINT"[3"[DOWN]"][s W]HAT IS ITS FIL
 ETYPE ([s S]/[s P])";                      KJ
·230 GETT$:IFT$<>"[s P]"ANDT$<>"[s S]"AND
 T$<>"S"ANDT$<>"P"THEN 230                  NG
·240 IFT$="[s P]"ORT$="[s S]"THENT$=CHR$(
 ASC(T$)-128)                               MO
·250 PRINT"[CLEAR][5"[DOWN]"] [s N]OW OPE
 NING FILE->[GREEN]";CHR$(34);F$;",";T$;C
 HR$(34);"[c 8]"                            CD
·260 BL=8                                   HN
·270 PRINT"[5"[DOWN]"][s I]S THIS ALL COR
 RECT? ([s Y]/[s N])";                      BI
·280 GETA$:IFA$<>"[s Y]"ANDA$<>"Y"ANDA$<>
 "[s N]"ANDA$<>"N"THEN 280                  PA
·290 IFA$="[s N]"ORA$="N"THENF$="":GOTO 1
 80                                         IC
·300 PRINT"[CLEAR] [s S]END OUTPUT TO THE
  [RVSON][s S][RVSOFF]CREEN OR [RVSON][s
 P][RVSOFF]RINTER"                          MJ
·310 GETA$:IFA$<>"[s S]"ANDA$<>"S"ANDA$<>
 "[s P]"ANDA$<>"P"THEN 310                  EG
·320 IFA$="S"ORA$="[s S]"THENDV=3:WD=40:G
 OTO 340                                    KI
·330 DV=4:BL=16                             IB
·340 OPEN15,8,15                            AM
·341 IFF$="$"THENOPEN8,8,0,"$0":GOTO360     KO
·350 OPEN8,8,8,F$+","+T$+",R"               MJ
·360 OPEN1,DV,7                             PE
·370 GET#8,LO$,HI$:HI=ASC(HI$+CHR$(0)):LO
 =ASC(LO$+CHR$(0))                          NE
·380 SA=LO+256*HI                           FK
·390 GOSUB 4490                             GE
·400 PRINT#1,:PRINT#1,"[s F]ILENAME:=>";F
 $:PRINT#1,                                 CP
·410 PRINT#1," [s S]TARTING [s A]DDRESS=
 #"SA" =$"HX$(HI)HX$(LO)                    PO
·420 PRINT:PRINT:PRINT                      EF
·430 PRINT"[s S]ELECT [s D]UMP TYPE":PRIN
 T"1> [s H]EX [s D]UMP":PRINT"2> [s A][s
 S][s C][s I][s I] [s D]UMP":PRINT"3> [s
 D]ISASSEMBLY"                              EF
·440 PRINT"4> [s B]ASIC [s L][s I][s S][s
```

```
 T]"                                       KC
•450 GETA$:IFVAL(A$)>4ORVAL(A$)<1THEN 450 MP
•460 PC=0                                  HK
•470 PRINT"[CLEAR]"                        HH
•480 IFA$="2"THEN 780                      FP
•500 IFA$="3"THEN 880                      HL
•510 IFA$="4"THEN 1441                     KA
•570 TM=BL*(INT((SA+PC)/BL)):IFTM=SA+PCTH
 EN 610                                    GB
•580 PRINT#1,CHR$(13);:H=INT((TM)/256):L=
 TM-(256*H)                                LF
•590 PRINT#1,HX$(H)HX$(L)"->";             LE
•600 FORNM=1TO(SA+PC)-TM:PRINT#1,"-- ";:N
 EXT                                       MJ
•610 GET#8,A$:VL=ASC(A$+CHR$(0))           JI
•620 IFST<>0THEN4450                       FL
•630 IF(SA+PC)/BL<>INT((SA+PC)/BL)THEN 69
 0                                         OB
•640 GETK$:IFK$<>" "THEN 670               FG
•650 GETK$:IFK$<>CHR$(13)ANDK$<>"+"ANDK$<
 >"Q"THEN 650                              KA
•660 IFK$="Q"THEN 4450                     MK
•661 IFK$="+"THENGOSUB7000                 CO
•670 PRINT#1,CHR$(13);:H=INT((SA+PC)/256)
 :L=SA+PC-(256*H)                          BO
•680 PRINT#1,HX$(H)HX$(L)"->";             LE
•690 PRINT#1,HX$(VL)" ";:PC=PC+1           HP
•700 GOTO 610                              CD
•710 PC=PC-1:PRINT#1,CHR$(13);:H=INT((SA+
 PC)/256):L=SA+PC-(256*H)                  FK
•720 PRINT#1," [s E]NDING ADDRESS = #"SA+
 PC" =$"HX$(H)HX$(L):GOTO 4450             CI
•780 GET#8,A$:VL=ASC(A$+CHR$(0))           JI
•790 IFST<>0THEN4450                       FL
•830 PRINT#1,CD$(VL);:PC=PC+1              MA
•840 GETK$:IFK$<>" "THEN 870               HI
•850 GETK$:IFK$<>CHR$(13)ANDK$<>"+"ANDK$<
 >"Q"THEN 850                              KC
•860 IFK$="Q"THEN 4450                     MK
•861 IFK$="+"THENGOSUB7000                 CO
•870 GOTO 780                              CL
•880 PRINT:PRINT:PRINT"[s D]O YOU WISH TO
  CHANGE [s S]TARTING":PRINT"ADDRESS ([s
 Y]/[s N])?"                               IJ
•890 GETA$:IFA$<>"[s Y]"ANDA$<>"Y"ANDA$<>
 "[s N]"ANDA$<>"N"THEN 890                 PH
•900 IFA$="N"ORA$="[s N]"THEN1000          DI
•910 PRINT:PRINT:PRINT:PRINT"[s E]NTER TH
 E [s N][s E][s W] STARTING ADDRESS IN"    CH
•920 PRINT"DECIMAL."                       AN
•930 INPUT"#=";S$                          NE
•940 IFS$=""THEN1000                       HH
•950 SA=VAL(S$)                            NC
•1000 REM***************************       CE
•1010 PRINT#1,CHR$(13);CHR$(13);"[s S]TAR
 TING [s A]DDRESS =#";                     EK
•1020 PRINT#1,SA;" = $"HX$(INT(SA/256));H
 X$(SA-(INT(SA/256)*256))                  GP
•1030 PRINT#1,CHR$(13)                     HO
•1040 PC=0                                 HK
•1050 GET#8,A$                             JL
•1060 IFST<>0THEN4450                      FL
•1080 PRINT#1,CHR$(13);:H=INT((SA+PC)/256
 ):L=SA+PC-(256*H)                         BO
•1090 PRINT#1,HX$(H)HX$(L)"- ";            JB
•1100 VL=ASC(A$+CHR$(0))                   MG
•1110 IFAR(VL)=1THENGET#8,A$:B1=ASC(A$+CH
 R$(0)):IFST<>0THEN4450                    KD
•1120 IFAR(VL)<>2THEN 1150                 DI
•1130 GET#8,A$:B1=ASC(A$+CHR$(0)):IFST<>0
 THEN4450                                  CD
•1140 GET#8,A$:B2=ASC(A$+CHR$(0)):IFST<>0
 THEN4450                                  CK
•1150 PRINT#1,HX$(VL);" ";:IFAR(VL)=0THEN
 PRINT#1,"[10" "]";                        IN
•1160 IFAR(VL)=1THENPRINT#1,HX$(B1);"[8"
 "]";                                      IH
•1170 IFAR(VL)=2THENPRINT#1,HX$(B1);" ";H
 X$(B2);"[5" "]";                          NK
•1180 O$=OP$(VL):IFMID$(O$,1,1)="[s B]"AN
 DMID$(O$,1,3)<>"[s B][s I][s T]"THEN 125
 0                                         HG
•1190 FORX=1TOLEN(O$)                      NL
•1200 IFMID$(O$,X,1)<>"1"ANDMID$(O$,X,1)<
 >"2"THENPRINT#1,MID$(O$,X,1);             AK
•1210 IFMID$(O$,X,1)="1"THENPRINT#1,HX$(B
 1);                                       GG
•1220 IFMID$(O$,X,1)="2"THENPRINT#1,HX$(B
 2);                                       HM
•1230 NEXT                                 IA
•1240 GOTO 1310                            FE
•1250 IFB1>127THENB1=-(256-B1)             OD
•1260 FORX=1TOLEN(O$)                      NL
•1270 IFMID$(O$,X,1)<>"0"THENPRINT#1,MID$
 (O$,X,1);:GOTO 1300                       JG
•1280 PP=PC+SA+B1+2                        AG
•1290 PRINT#1,HX$(INT(PP/256));HX$(PP-(IN
 T(PP/256)*256));                          PO
•1300 NEXT                                 IA
•1310 PC=PC+AR(VL)+1:B1=0:B2=0             GN
•1320 GETK$:IFK$<>" "THEN 1350             HN
•1330 GETK$:IFK$<>CHR$(13)ANDK$<>"+"ANDK$
 <>"Q"THEN 1330                            OJ
•1340 IFK$="Q"THEN 4450                    MK
•1341 IFK$="+"THENGOSUB7000                CO
•1350 GOTO 1050                            FN
•1370 PRINT#1,CHR$(13)"[s E]NDING [s A]DD
 RESS =#"PC+SA" =$"HX$(INT(SA+PC)/256);    EN
•1380 PRINT#1,HX$((SA+PC)-256*(INT((SA+PC
 )/256)))CHR$(13)                          AL
•1390 GOTO 4450                            FM
•1441 CD$(0)=""                            CG
•1480 PRINT:PRINT                          GJ
•1490 GET#8,P1$,P2$,L1$,L2$:IFST<>0THEN44
 50                                        KF
•1500 LI=256*(ASC(L2$+CHR$(0)))+ASC(L1$+C
```

```
HR$(0)):QM=0                                AG
•1510 PRINT#1,MID$(STR$(LI),2,LEN(STR$(LI
 ))-1)" ";                                  JD
•1520 GET#8,A$:IFST<>0THEN4450              CP
•1530 VL=ASC(A$+CHR$(0)):IFVL=0THENPRINT#
 1,CHR$(13);:QM=0:GOTO 1490                 OK
•1550 IFVL=34THENQM=ABS(QM=0)               LC
•1580 PRINT#1,CD$(VL*ABS(QM=1));KW$(VL*AB
 S(QM=0));                                  NC
•1590 GETG$:IFG$<>" "THEN 1630              KC
•1600 GETG$:IFG$<>CHR$(13)ANDG$<>"Q"THEN
 1600                                       OE
•1610 IFG$<>"Q"THEN 1630                    FI
•1620 GOTO 4450                             FM
•1630 GOTO 1520                             FN
•1640 GOTO 4450                             FM
•1650 GOSUB 4490:CLOSE1:CLOSE8:CLOSE15:EN
 D                                          JF
•1660 DATA"00","[s B][s R][s K]",0          GK
•1670 DATA"01","[s O][s R][s A] ($1,[s X]
 )",1                                       CL
•1680 DATA"02","[3"?"]",0                   MK
•1690 DATA"03","[3"?"]",0                   MN
•1700 DATA"04","[3"?"]",0                   MI
•1710 DATA"05","[s O][s R][s A] $1",1       MK
•1720 DATA"06","[s A][s S][s L] $1",1       ON
•1730 DATA"07","[3"?"]",0                   LJ
•1740 DATA"08","[s P][s H][s P]",0          HP
•1750 DATA"09","[s O][s R][s A] #$1",1      CK
•1760 DATA"0[s A]","[s A][s S][s L]",0      OO
•1770 DATA"0[s B]","[3"?"]",0               FK
•1780 DATA"0[s C]","[3"?"]",0               FN
•1790 DATA"0[s D]","[s O][s R][s A] $21",
 2                                          HL
•1800 DATA"0[s E]","[s A][s S][s L] $21",
 2                                          JC
•1810 DATA"0[s F]","[3"?"]",0               GG
•1820 DATA"10","[s B][s P][s L] $0",1       LD
•1830 DATA"11","[s O][s R][s A] ($1),[s Y
 ]",1                                       GF
•1840 DATA"12","[3"?"]",0                   OP
•1850 DATA"13","[3"?"]",0                   MC
•1860 DATA"14","[3"?"]",0                   MF
•1870 DATA"15","[s O][s R][s A] $1,[s X]"
 ,1                                         OI
•1880 DATA"16","[s A][s S][s L] $1,[s X]"
 ,1                                         LN
•1890 DATA"17","[3"?"]",0                   MO
•1900 DATA"18","[s C][s L][s C]",0          FE
•1910 DATA"19","[s O][s R][s A] $21,[s Y]
 ",2                                        BD
•1920 DATA"1[s A]","[3"?"]",0               FE
•1930 DATA"1[s B]","[3"?"]",0               HP
•1940 DATA"1[s C]","[3"?"]",0               FC
•1950 DATA"1[s D]","[s O][s R][s A] $21,[
 s X]",2                                    JB
•1960 DATA"1[s E]","[s A][s S][s L] $21,[
 s X]",2                                    MC
•1970 DATA"1[s F]","[3"?"]",0               EL
•1980 DATA"20","[s J][s S][s R] $21",2      CG
•1990 DATA"21","[s A][s N][s D] ($1,[s X]
 )",1                                       PO
•2000 DATA"22","[3"?"]",0                   ME
•2010 DATA"23","[3"?"]",0                   OP
•2020 DATA"24","[s B][s I][s T] $1",1       MO
•2030 DATA"25","[s A][s N][s D] $1",1       OJ
•2040 DATA"26","[s R][s O][s L] $1",1       NO
•2050 DATA"27","[3"?"]",0                   LL
•2060 DATA"28","[s P][s L][s P]",0          HF
•2070 DATA"29","[s A][s N][s D] #$1",1      NB
•2080 DATA"2[s A]","[s R][s O][s L]",0      OH
•2090 DATA"2[s B]","[3"?"]",0               FE
•2100 DATA"2[s C]","[s B][s I][s T] $21",
 2                                          KL
•2110 DATA"2[s D]","[s A][s N][s D] $21",
 2                                          LO
•2120 DATA"2[s E]","[s R][s O][s L] $21",
 2                                          KD
•2130 DATA"2[s F]","[3"?"]",0               DA
•2140 DATA"30","[s B][s M][s I] $0",1       MN
•2150 DATA"31","[s A][s N][s D] ($1),[s Y
 ]",1                                       PM
•2160 DATA"32","[3"?"]",0                   LJ
•2170 DATA"33","[3"?"]",0                   ME
•2180 DATA"34","[3"?"]",0                   OP
•2190 DATA"35","[s A][s N][s D] $1,[s X]"
 ,1                                         AB
•2200 DATA"36","[s R][s O][s L] $1,[s X]"
 ,1                                         AI
•2210 DATA"37","[3"?"]",0                   KA
•2220 DATA"38","[s S][s E][s C]",0          EN
•2230 DATA"39","[s A][s N][s D] $21,[s Y]
 ",2                                        BE
•2240 DATA"3[s A]","[3"?"]",0               GG
•2250 DATA"3[s B]","[3"?"]",0               EJ
•2260 DATA"3[s C]","[3"?"]",0               FE
•2270 DATA"3[s D]","[s A][s N][s D] $21,[
 s X]",2                                    KG
•2280 DATA"3[s E]","[s R][s O][s L] $21,[
 s X]",2                                    MN
•2290 DATA"3[s F]","[3"?"]",0               FF
•2300 DATA"40","[s R][s T][s I]",0          IG
•2310 DATA"41","[s E][s O][s R] ($1,[s X]
 )",1                                       EJ
•2320 DATA"42","[3"?"]",0                   NG
•2330 DATA"43","[3"?"]",0                   LJ
•2340 DATA"44","[3"?"]",0                   ME
•2350 DATA"45","[s E][s O][s R] $1",1       PI
•2360 DATA"46","[s L][s S][s R] $1",1       AI
•2370 DATA"47","[3"?"]",0                   MF
•2380 DATA"48","[s P][s H][s A]",0          EE
•2390 DATA"49","[s E][s O][s R] #$1",1      NM
•2400 DATA"4[s A]","[s L][s S][s R]",0      ON
•2410 DATA"4[s B]","[3"?"]",0               GG
•2420 DATA"4[s C]","[s J][s M][s P] $21",
 2                                          MN
```

```
•2430 DATA"4[s D]","[s E][s O][s R] $21",
 2                                      JJ
•2440 DATA"4[s E]","[s L][s S][s R] $21",
 2                                      NB
•2450 DATA"4[s F]","[3"?"]",0            FC
•2460 DATA"50","[s B][s V][s C] $0",1    PI
•2470 DATA"51","[s E][s O][s R] ($1),[s Y
 ]",1                                   FP
•2480 DATA"52","[3"?"]",0                LL
•2490 DATA"53","[3"?"]",0                MO
•2500 DATA"54","[3"?"]",0                LB
•2510 DATA"55","[s E][s O][s R] $1,[s X]"
 ,1                                     CK
•2520 DATA"56","[s L][s S][s R][SS]$1,[s
 X]",1                                  FF
•2530 DATA"57","[3"?"]",0                NK
•2540 DATA"58","[s C][s L][s I]",0       HK
•2550 DATA"59","[s E][s O][s R] $21,[s Y]
 ",2                                    BN
•2560 DATA"5[s A]","[3"?"]",0            DA
•2570 DATA"5[s B]","[3"?"]",0            EL
•2580 DATA"5[s C]","[3"?"]",0            FO
•2590 DATA"5[s D]","[s E][s O][s R] $21,[
 s X]",2                                JP
•2600 DATA"5[s E]","[s L][s S][s R] $21,[
 s X]",2                                KH
•2610 DATA"5[s F]","[3"?"]",0            FH
•2620 DATA"60","[s R][s T][s S]",0       IG
•2630 DATA"61","[s A][s D][s C] ($1,[s X]
 )",1                                   ED
•2640 DATA"62","[s A][s D][s C] $1",1    LJ
•2650 DATA"63","[3"?"]",0                LL
•2660 DATA"64","[3"?"]",0                MO
•2670 DATA"65","[s A][s D][s C] $1",1    NC
•2680 DATA"66","[s R][s O][s R] $1",1    AA
•2690 DATA"67","[3"?"]",0                MH
•2700 DATA"68","[s P][s L][s A]",0       HK
•2710 DATA"69","[s A][s D][s C] #$1",1   OC
•2720 DATA"6[s A]","[s R][s O][s R]",0   BN
•2730 DATA"6[s B]","[3"?"]",0            DA
•2740 DATA"6[s C]","[s J][s M][s P] (21)"
 ,2                                     JC
•2750 DATA"6[s D]","[s A][s D][s C] $21",
 2                                      HL
•2760 DATA"6[s E]","[s R][s O][s R] $21",
 2                                      KB
•2770 DATA"6[s F]","[3"?"]",0            GM
•2780 DATA"70","[s B][s V][s S] $0",1    PO
•2790 DATA"71","[s A][s D][s C] ($1),[s Y
 ]",1                                   PN
•2800 DATA"72","[3"?"]",0                MF
•2810 DATA"73","[3"?"]",0                KA
•2820 DATA"74","[3"?"]",0                LL
•2830 DATA"75","[s A][s D][s C] $1,[s X]"
 ,1                                     OA
•2840 DATA"76","[s R][s O][s R] $1,[s X]"
 ,1                                     CK
•2850 DATA"77","[3"?"]",0                NM
•2860 DATA"78","[s S][s E][s I]",0       JD
•2870 DATA"79","[s A][s D][s C] $21,[s Y]
 ",2                                    CL
•2880 DATA"7[s A]","[3"?"]",0            FC
•2890 DATA"7[s B]","[3"?"]",0            FF
•2900 DATA"7[s C]","[3"?"]",0            DA
•2910 DATA"7[s D]","[s A][s D][s C] $21,[
 s X]",2                                IB
•2920 DATA"7[s E]","[s R][s O][s R] $21,[
 s X]",2                                NH
•2930 DATA"7[s F]","[3"?"]",0            EB
•2940 DATA"80","[3"?"]",0                ME
•2950 DATA"81","[s S][s T][s A] ($1,[s X]
 )",1                                   FB
•2960 DATA"82","[3"?"]",0                MC
•2970 DATA"83","[3"?"]",0                MF
•2980 DATA"84","[s S][s T][s Y] $1",1    AB
•2990 DATA"85","[s S][s T][s A] $1",1    NA
•3000 DATA"86","[s S][s T][s X] $1",1    AC
•3010 DATA"87","[3"?"]",0                LB
•3020 DATA"88","[s D][s E][s Y]",0       JP
•3030 DATA"89","[3"?"]",0                MH
•3040 DATA"8[s A]","[s T][s X][s A]",0   BP
•3050 DATA"8[s B]","[3"?"]",0            FC
•3060 DATA"8[s C]","[s S][s T][s Y] $21",
 2                                      MC
•3070 DATA"8[s D]","[s S][s T][s A] $21",
 2                                      MN
•3080 DATA"8[s E]","[s S][s T][s X] $21",
 2                                      MP
•3090 DATA"8[s F]","[3"?"]",0            FO
•3100 DATA"90","[s B][s C][s C] $0",1    PH
•3110 DATA"91","[s S][s T][s A] ($1),[s Y
 ]",1                                   ID
•3120 DATA"92","[3"?"]",0                MH
•3130 DATA"93","[3"?"]",0                NK
•3140 DATA"94","[s S][s T][s Y] $1,[s X]"
 ,1                                     CN
•3150 DATA"95","[s S][s T][s A] $1,[s X]"
 ,1                                     NO
•3160 DATA"96","[s S][s T][s X] $1,[s X]"
 ,1                                     PM
•3170 DATA"97","[3"?"]",0                OG
•3180 DATA"98","[s T][s Y][s A]",0       HA
•3190 DATA"99","[s S][s T][s A] $21,[s Y]
 ",2                                    PJ
•3200 DATA"9[s A]","[s T][s X][s S]",0   DK
•3210 DATA"9[s B]","[3"?"]",0            FH
•3220 DATA"9[s C]","[3"?"]",0            GK
•3230 DATA"9[s D]","[s S][s T][s A] $21,[
 s X]",2                                KH
•3240 DATA"9[s E]","[3"?"]",0            GI
•3250 DATA"9[s F]","[3"?"]",0            GD
•3260 DATA"[s A]0","[s L][s D][s Y] #$1",
 1                                      KN
•3270 DATA"[s A]1","[s L][s D][s A] ($1,[
 s X])",1                               ON
•3280 DATA"[s A]2","[s L][s D][s X] #$1",
```

```
1                                               OO
•3290 DATA"[s A]3","[3"?"]",0                    FC
•3300 DATA"[s A]4","[s L][s D][s Y] $1",1        HN
•3310 DATA"[s A]5","[s L][s D][s A] $1",1        FM
•3320 DATA"[s A]6","[s L][s D][s X] $1",1        HG
•3330 DATA"[s A]7","[3"?"]",0                    FO
•3340 DATA"[s A]8","[s T][s A][s Y]",0           BI
•3350 DATA"[s A]9","[s L][s D][s A] #$1",
1                                               IA
•3360 DATA"[s A][s A]","[s T][s A][s X]",
0                                               KG
•3370 DATA"[s A][s B]","[3"?"]",0                AP
•3380 DATA"[s A][s C]","[s L][s D][s Y] $
21",2                                           DG
•3390 DATA"[s A][s D]","[s L][s D][s A] $
21",2                                           CJ
•3400 DATA"[s A][s E]","[s L][s D][s X] $
21",2                                           BL
•3410 DATA"[s A][s F]","[3"?"]",0                NL
•3420 DATA"[s B]0","[s B][s C][s S] $0",1        GM
•3430 DATA"[s B]1","[s L][s D][s A] ($1),
[s Y]",1                                        JH
•3440 DATA"[s B]2","[3"?"]",0                    FE
•3450 DATA"[s B]3","[3"?"]",0                    HP
•3460 DATA"[s B]4","[s L][s D][s Y] $1,[s
 X]",1                                          HJ
•3470 DATA"[s B]5","[s L][s D][s A] $1,[s
 X]",1                                          DC
•3480 DATA"[s B]6","[s L][s D][s X] $1,[s
 Y]",1                                          HP
•3490 DATA"[s B]7","[3"?"]",0                    EL
•3500 DATA"[s B]8","[s C][s L][s V]",0           CI
•3510 DATA"[s B]9","[s L][s D][s A] $21,[
s Y]",2                                         JF
•3520 DATA"[s B][s A]","[s T][s S][s X]",
0                                               JF
•3530 DATA"[s B][s B]","[3"?"]",0                OE
•3540 DATA"[s B][s C]","[s L][s D][s Y] $
21,[s X]",2                                     IC
•3550 DATA"[s B][s D]","[s L][s D][s A] $
21,[s X]",2                                     GL
•3560 DATA"[s B][s E]","[s L][s D][s X] $
21,[s Y]",2                                     EK
•3570 DATA"[s B][s F]","[3"?"]",0                MA
•3580 DATA"[s C]0","[s C][s P][s Y] #$1",
1                                               IM
•3590 DATA"[s C]1","[s C][s M][s P] ($1,[
s X])",1                                        MG
•3600 DATA"[s C]2","[3"?"]",0                    EJ
•3610 DATA"[s C]3","[3"?"]",0                    FE
•3620 DATA"[s C]4","[s C][s P][s Y] $1",1        JA
•3630 DATA"[s C]5","[s C][s M][s P] $1",1        IB
•3640 DATA"[s C]6","[s D][s E][s C] $1",1        HC
•3650 DATA"[s C]7","[3"?"]",0                    DA
•3660 DATA"[s C]8","[s I][s N][s Y]",0           OA
•3670 DATA"[s C]9","[s C][s M][s P] #$1",
1                                               JJ
•3680 DATA"[s C][s A]","[s D][s E][s X]",
0                                               HE
•3690 DATA"[s C][s B]","[3"?"]",0                NJ
•3700 DATA"[s C][s C]","[s C][s P][s Y] $
21",2                                           GN
•3710 DATA"[s C][s D]","[s C][s M][s P] $
21",2                                           BG
•3720 DATA"[s C][s E]","[s D][s E][s C] $
21",2                                           PL
•3730 DATA"[s C][s F]","[3"?"]",0                OF
•3740 DATA"[s D]0","[s B][s N][s E] $0",1        FN
•3750 DATA"[s D]1","[s C][s M][s P] ($1),
[s Y]",1                                        HE
•3760 DATA"[s D]2","[3"?"]",0                    GG
•3770 DATA"[s D]3","[3"?"]",0                    EJ
•3780 DATA"[s D]4","[3"?"]",0                    FE
•3790 DATA"[s D]5","[s C][s M][s P] $1,[s
 X]",1                                          FJ
•3800 DATA"[s D]6","[s D][s E][s C] $1,[s
 X]",1                                          GA
•3810 DATA"[s D]7","[3"?"]",0                    FF
•3820 DATA"[s D]8","[s C][s L][s D]",0           PM
•3830 DATA"[s D]9","[s C][s M][s P] $21,[
s Y]",2                                         KM
•3840 DATA"[s D][s A]","[3"?"]",0                OD
•3850 DATA"[s D][s B]","[3"?"]",0                PG
•3860 DATA"[s D][s C]","[3"?"]",0                NJ
•3870 DATA"[s D][s D]","[s C][s M][s P] $
21,[s X]",2                                     FG
•3880 DATA"[s D][s E]","[s D][s E][s C] $
21,[s X]",2                                     BB
•3890 DATA"[s D][s F]","[3"?"]",0                OC
•3900 DATA"[s E]0","[s C][s P][s X] #$1",
1                                               MF
•3910 DATA"[s E]1","[s S][s B][s C] ($1,[
s X])",1                                        LC
•3920 DATA"[s E]2","[3"?"]",0                    EL
•3930 DATA"[s E]3","[3"?"]",0                    FO
•3940 DATA"[s E]4","[s C][s P][s X] $1",1        HF
•3950 DATA"[s E]5","[s S][s B][s C] $1",1        HN
•3960 DATA"[s E]6","[s I][s N][s C] $1",1        HO
•3970 DATA"[s E]7","[3"?"]",0                    GK
•3980 DATA"[s E]8","[s I][s N][s X]",0           BJ
•3990 DATA"[s E]9","[s S][s B][s C] #$1",
1                                               KF
•4000 DATA"[s E][s A]","[s N][s O][s P]",
0                                               IC
•4010 DATA"[s E][s B]","[3"?"]",0                NL
•4020 DATA"[s E][s C]","[s C][s P][s X] $
21",2                                           EK
•4030 DATA"[s E][s D]","[s S][s B][s C] $
21",2                                           FO
•4040 DATA"[s E][s E]","[s I][s N][s C] $
21",2                                           DP
•4050 DATA"[s E][s F]","[3"?"]",0                OH
•4060 DATA"[s F]0","[s B][s E][s Q] $0",1        GA
•4070 DATA"[s F]1","[s S][s B][s C] ($1),
[s Y]",1                                        OM
•4080 DATA"[s F]2","[3"?"]",0                    DA
```

```
·4090 DATA"[s F]3","[3"?"]",0                EL
·4100 DATA"[s F]4","[3"?"]",0                FO
·4110 DATA"[s F]5","[s S][s B][s C] $1,[s
  X]",1                                      KB
·4120 DATA"[s F]6","[s I][s N][s C] $1,[s
  X]",1                                      KE
·4130 DATA"[s F]7","[3"?"]",0                FH
·4140 DATA"[s F]8","[s S][s E][s D]",0       AB
·4150 DATA"[s F]9","[s S][s B][s C] $21,[
 s Y]",2                                     ME
·4160 DATA"[s F][s A]","[3"?"]",0            OF
·4170 DATA"[s F][s B]","[3"?"]",0            MA
·4180 DATA"[s F][s C]","[3"?"]",0            NL
·4190 DATA"[s F][s D]","[s S][s B][s C] $
 21,[s X]",2                                 EK
·4200 DATA"[s F][s E]","[s I][s N][s C] $
 21,[s X]",2                                 EF
·4210 DATA"[s F][s F]","[3"?"]",0            PM
·4220 DATA"[s E][s N][s D]","[s F][s O][s
  R]","[s N][s E][s X][s T]","[s D][s A][
 s T][s A]","[s I][s N][s P][s U][s T]#",
 "[s I][s N][s P][s U][s T]","[s D][s I][
 s M]","[s R][s E][s A][s D]","[s L][s E]
 [s T]","[s G][s O][s T][s O]"               DN
·4230 DATA"[s R][s U][s N]","[s I][s F]",
 "[s R][s E][s S][s T][s O][s R][s E]","[
 s G][s O][s S][s U][s B]","[s R][s E][s
 T][s U][s R][s N]","[s R][s E][s M]","[s
  S][s T][s O][s P]","[s O][s N]","[s W][
 s A][s I][s T]","[s L][s O][s A][s D]"      EF
·4240 DATA"[s S][s A][s V][s E]","[s V][s
  E][s R][s I][s F][s Y]","[s D][s E][s F
 ]","[s P][s O][s K][s E]","[s P][s R][s
 I][s N][s T]#","[s P][s R][s I][s N][s T
 ]","[s C][s O][s N][s T]","[s L][s I][s
 S][s T]","[s C][s L][s R]"                  LN
·4250 DATA"[s C][s M][s D]","[s S][s Y][s
  S]","[s O][s P][s E][s N]","[s C][s L][
 s O][s S][s E]","[s G][s E][s T]","[s N]
 [s E][s W]","[s T][s A][s B](","[s T][s
 O]","[s F][s N]","[s S][s P][s C](","[s
 T][s H][s E][s N]"                          KL
·4260 DATA"[s N][s O][s T]","[s S][s T][s
  E][s P]","+","-","*","/","[UPARROW]","[
 s A][s N][s D]","[s O][s R]",">","=","<"
 ,"[s S][s G][s N]","[s I][s N][s T]"        OA
·4270 DATA"[s A][s B][s S]","[s U][s S][s
  R]","[s F][s R][s E]","[s P][s O][s S]"
 ,"[s S][s Q][s R]","[s R][s N][s D]","[s
  L][s O][s G]","[s E][s X][s P]","[s C][
 s O][s S]","[s S][s I][s N]"                CJ
·4280 DATA"[s T][s A][s N]","[s A][s T][s
  N]","[s P][s E][s E][s K]","[s L][s E][
 s N]","[s S][s T][s R]$","[s V][s A][s L
 ]","[s A][s S][s C]","[s C][s H][s R]$",
 "[s L][s E][s F][s T]$"                     FD
·4290 DATA"[s R][s I][s G][s H][s T]$","[
 s M][s I][s D]$"                            AO
```

```
·4300 DATA".",".",".",".",".","<WHITE>","
 .",".","<DISABLE[s C]=>","<ENABLE[s C]=>
 ","."                                       NJ
·4310 DATA.,.,"<[s C]/[s R]>",<LOWERCASE>
 ,.,.,.,<DOWN>,<RVSON>,<HOME>,"<[s D][s E][
 s L]>"                                      NA
·4320 DATA".",".",".",".",".",".",".","<R
 ED>","<RIGHT>","<GREEN>","<BLUE>"           ID
·4330 DATA" ","!","'","#","$","%","&","'"
 ,"(",")","*","+",",","-",".","/"            AF
·4340 DATA0,1,2,3,4,5,6,7,8,9,":",";","<"
 ,"=",">","?","@"                            BI
·4350 DATA"A","B","C","D","E","F","G","H"
 ,"I","J","K","L","M","N","O","P"            IO
·4360 DATA"Q","R","S","T","U","V","W","X"
 ,"Y","Z","[","[EP]","]","[UPARROW]","[BA
 CKARROW]","-"                               AD
·4370 DATA"[s A]","[s B]","[s C]","[s D]"
 ,"[s E]","[s F]","[s G]","[s H]","[s I]"
 ,"[s J]","[s K]","[s L]","[s M]","[s N]"
 ,"[s O]","[s P]"                            IO
·4380 DATA"[s Q]","[s R]","[s S]","[s T]"
 ,"[s U]","[s V]","[s W]","[s X]","[s Y]"
 ,"[s Z]"                                    PF
·4390 DATA.,.,.,.,.,.,.,<ORANGE>,.,.,.,.,.,
 .,.,.,.,.,.,.,"<[s S][s C][s R]>","<[s U][
 s C]>",.                                    BE
·4400 DATA<BLACK>,<UP>,<RVSOFF>,"<[s C][s
  L][s R]>","<[s D][s E][s L]>",<BROWN>,<
 L RED>,<GRAY1>,<GRAY2>                      GF
·4410 DATA<L GRN>,<L BLU>,<GRAY3>,<PURPLE
 >,<LEFT>,<YELLOW>,<CYAN>," "                MO
·4420 FORX=161TO191:CD$(X)=".":NEXT:FORX=
 192TO223:CD$(X)=CD$(X-96):NEXT              GO
·4430 FORX=224TO254:CD$(X)=CD$(X-64):NEXT
 :CD$(255)="<PI>":CD$(126)="<PI>"            CO
·4440 CD$(13)=CHR$(13):CD$(34)=CHR$(34):R
 ETURN                                       LM
·4450 PRINT:PRINT"[RVSON]  [s E]ND OF [s
 F]ILE, PRESS ANY KEY":CLOSE1:CLOSE8:CLOS
 E15                                         EI
·4451 CD$(0)="."                             FK
·4460 POKE198,0:GETA$                        PB
·4470 GETA$:IFA$=""ORA$="[F1]"THEN 4470      EK
·4480 GOTO 180                               CN
·4490 INPUT#15,ER,ER$,TR,SC                  DH
·4500 IFER<>0THENPRINT"[RVSON][RED][s D]I
 SK [s E]RROR[RVSOFF][c 8]":PRINTER"--"ER
 $" AT "TR","SC:CLOSE1:CLOSE8:CLOSE15:END    PL
·4510 RETURN                                 IM
·4520 IFST=64ORST<>0THEN 4450                ML
·4530 RETURN                                 IM
·7000 CLOSE1:IFDV=4THENDV=3:OPEN1,DV,1:RE
 TURN                                        EA
·7001 DV=4:OPEN1,DV,1:RETURN                 IN
```

IMPORTANT! Letters on white background are **Bug Repellent** line codes. **Do not enter them!** Pages 109 and 110 explain these codes and provide other essential information on entering *Ahoy!* programs. Refer to these pages **before** entering any programs!

CADET'S DOS REVISITED
FROM PAGE 85

CADET'S DOS 1.2

```
•1 SCNCLR                                   OK
•2 WINDOW 1,0,39,16:SCNCLR                  AF
•4 PRINT"[37"*"]"                           KG
•5 PRINT"*[35" "]*"                         IN
•6 PRINT"*[11" "]CADET'S DOS 1.2[9" "]*"    FK
•7 PRINT"*[35" "]*"                         IN
•8 PRINT"*[5" "]MODIFIED BY ROBERT WEMPE[
 6" "]*"                                    PK
•9 PRINT"[37"*"]":PRINT                     HM
•10 PRINTTAB(3);"A",TAB(4)"ACCESS DIRECTO
 RY"                                        EG
•20 PRINTTAB(3);"B",TAB(4)"BACKUP FILES"    BJ
•30 PRINTTAB(3);"C",TAB(4)"COLLECT FILES"   LJ
•40 PRINTTAB(3);"D",TAB(4)"DELETE FILES"    AA
•50 PRINTTAB(3);"E",TAB(4)"EXIT TO BASIC"   DI
•60 PRINTTAB(3);"F",TAB(4)"FORMAT DISK"     FA
•70 PRINTTAB(3);"G",TAB(4)"GIVE FILE A NE
 W NAME"                                    ED
•80 WINDOW 1,16,39,18                       AP
•90 INPUT"ENTER YOUR CHOICE";X$             CP
•100 X=ASC(X$):X=X-64:ON X GOSUB 200,300,
 400,500,1000,700,800                       KO
•195 GOSUB 600                              CG
•199 GOTO 2                                 LP
•200 REM ACCESS DIRECTORY                   BD
•210 WINDOW 0,0,39,24:SCNCLR                OD
•220 WINDOW 5,3,39,24                       AK
•230 DIRECTORY                              OM
•240 PRINT:PRINT"HIT A KEY TO RETURN TO M
 ENU"                                       EP
•250 GETKEY Q$                              BG
•260 PRINT"[CLEAR]":RETURN                  DG
•300 REM BACKUP FILE                        HC
•310 GOSUB 2000                             FL
•320 COPY""+SF$+""TO""+NF$+"":RETURN        IN
•400 REM VALIDATE (COLLECT) DISK            HL
•410 WINDOW 1,20,39,24:SCNCLR               EG
•420 PRINT"WARNING:OPEN FILES WILL BE DEL
 ETED."                                     NK
•430 PRINT "HIT Y TO VALIDATE - ANY OTHER
  KEY TO RETURN"                            DG
•440 GETKEY Q$                              BG
•450 IF Q$="Y" THEN COLLECT:SCNCLR:RETURN
 :ELSE SCNCLR:RETURN                        OA
•500 REM ERASE FILE                         CF
•510 WINDOW 1,20,39,24:SCNCLR               EG
•520 INPUT "WHAT FILES TO DELETE";FI$       CO
•530 INPUT"DO YOU WISH TO CONTINUE";X$      JJ
•540 IF X$<>"Y"THEN RETURN                  EP
•550 SCRATCH""+FI$                          IA
•560 RETURN                                 IM
•600 REM DISPLAY DISK ERROR STATUS          PL
•610 WINDOW 1,20,39,24:SCNCLR               EG
•620 IF DS>0 THEN PRINT DS$:RETURN:ELSE R
 ETURN                                      GC
•700 REM FORMAT DISK                        KC
•710 WINDOW 1,20,39,24:SCNCLR               EG
•720 PRINT "INSERT DISK TO FORMAT"          HL
•730 PRINT "ENTER DISK NAME":INPUT DISK$    AJ
•740 PRINT:PRINT "ENTER EXTENDER NAME":IN
 PUT ID$                                    FM
•750 PRINT"PUT DISK TO BE ERASED IN DRIVE
 .":PRINT"PRESS Y TO CONTINUE. ";           KP
•760 INPUT"CONTINUE";Q$:IF Q$<>"Y" THEN R
 ETURN                                      FK
•770 HEADER""+DISK$+","+ID$:RETURN          IE
•800 REM GIVE FILE NEW NAME                 CA
•810 GOSUB 2000                             FL
•820 RENAME ""+SF$+""TO""+NF$+"":RETURN     IO
•1000 REM RETURN TO BASIC                   HO
•1010 SCNCLR:PRINT"[CLEAR][HOME][HOME][CL
 EAR]"                                      FH
•1020 PRINT "TO ERASE WEDGE FROM MEMORY T
 YPE NEW."                                  AO
•1030 PRINT "TO RETURN TO PROGRAM TYPE RU
 N"                                         AC
•1099 END                                   IC
•2000 REM INPUT ROUTINE                     EB
•2010 WINDOW 1,20,39,24:SCNCLR              EG
•2020 INPUT"WHAT SOURCE FILE";SF$           EJ
•2030 PRINT:INPUT "WHAT IS NEW FILE NAME"
 ;NF$                                       CA
•2040 SCNCLR                                OK
•2050 RETURN                                IM
```

BUGOUT
FROM PAGE 96

Starting address in hex: C000
Ending address in hex: C91D
SYS to start: 49152

***Flankspeed* required for entry! See page 111.**

```
C000: A9 E6 A0 C4 20 1E AB 20 FF
C008: B8 C3 A0 00 B9 1E C6 99 5D
C010: 00 3C B9 1E C7 99 00 3D C2
C018: B9 1E C8 99 00 3E C8 D0 2A
C020: EB A0 18 B9 AD C5 99 00 8B
C028: D4 88 10 F7 A0 3F 98 99 9F
C030: 80 3F 88 10 F9 A0 3F AD 10
C038: 1B D4 29 3F AA B9 80 3F B4
C040: 48 BD 80 3F 99 80 3F 68 C7
C048: 9D 80 3F 88 10 E9 8C 1C D0
C050: D0 A9 05 8D 20 D0 A9 0F 07
C058: 8D 25 D0 A9 09 8D 26 D0 13
C060: A0 27 A9 68 99 00 04 99 71
C068: F8 06 A9 02 99 00 D8 99 1F
```

```
C070: F8 DA 88 10 ED A2 14 A0 22
C078: 09 18 20 F0 FF A9 F8 A0 ED
C080: C4 20 1E AB A9 00 8D 40 A6
C088: C5 8D 10 D0 8D 17 D0 8D BF
C090: 1B D0 8D 1D D0 78 A9 7F 99
C098: 8D 0D DC A9 01 8D 1A D0 33
C0A0: 8D 12 D0 A9 1B 8D 11 D0 45
C0A8: A9 21 8D 14 03 A9 C4 8D 14
C0B0: 15 03 58 A9 30 8D 87 07 17
C0B8: 20 47 C3 A2 06 20 D2 C2 42
C0C0: CA 10 FA 20 49 C2 A9 7E EA
C0C8: 8D 01 D0 A9 19 8D 6E C5 AC
C0D0: A9 FF 8D 6D C5 8D 3F C5 CD
C0D8: 8D 15 D0 A9 00 8D 42 C5 8B
C0E0: A2 0A 8E 27 D0 8E 00 D0 73
C0E8: 8A 29 08 4A 4A 4A 09 F0 7D
C0F0: 8D F8 07 18 A5 A2 69 02 4A
C0F8: C5 A2 D0 FC E8 E0 42 90 CB
C100: E4 AD 1F D0 AD 8D 02 8D 4D
C108: 3F C5 D0 F8 AD 40 C5 0D 97
C110: 42 C5 D0 12 AD 00 DC 29 AE
C118: 10 D0 0B 20 69 C1 A9 81 7A
C120: 8D 04 D4 EE 40 C5 A5 03 24
C128: 29 08 4A 4A 4A 09 F0 AC DE
C130: 40 C5 F0 02 09 02 8D F8 BA
C138: 07 AD 1F D0 29 FE F0 16 0C
C140: 85 02 A2 06 06 02 90 08 11
C148: BD 51 C5 D0 03 20 74 C2 48
C150: CA 10 F1 AD 1F D0 20 A0 7B
C158: C1 AE 6E C5 A0 00 C8 D0 37
C160: FD CA D0 FA C6 03 4C 04 0F
C168: C1 A9 07 85 FB A9 04 85 8F
C170: FC 38 AD 01 D0 E9 2B 48 82
C178: 29 07 09 60 8D 41 C5 68 0F
C180: 4A 4A 4A A8 18 A5 FB 69 2B
C188: 28 85 FB A5 FC 69 00 85 C3
C190: FC 88 D0 F0 A5 FB 85 FD FC
C198: 18 A5 FC 69 D4 85 FE 60 76
C1A0: A2 06 BD 66 C5 F0 0E FE 31
C1A8: 4A C5 D0 03 FE 51 C5 DE 81
C1B0: 66 C5 4C 43 C2 BD 51 C5 04
C1B8: D0 3B 38 BD 4A C5 E9 3C F0
C1C0: C9 17 B0 31 38 AD 01 D0 3B
C1C8: E9 0A DD 43 C5 B0 26 18 92
C1D0: 69 1D DD 43 C5 90 1E BD AA
C1D8: F9 07 C9 FA B0 08 A9 C8 C9
C1E0: 9D 66 C5 4C 43 C2 AD 42 EC
C1E8: C5 D0 0A A9 07 8D 27 D0 BF
C1F0: A9 78 8D 42 C5 A5 03 29 7A
C1F8: 07 D0 1A 18 BD 43 C5 7D 47
C200: 5F C5 DD 8B C5 90 05 DD C7
C208: 92 C5 90 06 20 0C C3 4C 33
C210: 15 C2 9D 43 C5 A5 03 3D 74
C218: 58 C5 D0 27 38 BD 4A C5 34
C220: E9 02 A8 BD 51 C5 E9 00 73
C228: 10 12 20 D2 C2 EE 87 07 7D
C230: AD 87 07 C9 33 90 0C 68 6E
C238: 68 4C 74 C3 9D 51 C5 98 72
C240: 9D 4A C5 CA 30 03 4C A2 DA
C248: C1 A2 06 8A 0A A8 BD 43 F0
C250: C5 99 03 D0 BD 4A C5 99 EA
C258: 02 D0 AD 10 D0 3D 76 C5 33
C260: A8 BD 51 C5 29 01 F0 05 FD
C268: 98 1D 6F C5 A8 8C 10 D0 69
C270: CA 10 D8 60 BD F9 07 85 C8
C278: 39 A9 00 85 3A A0 06 06 C7
C280: 39 26 3A 88 D0 F9 A0 3F 4D
C288: B1 39 99 C0 3F 88 10 F8 9E
C290: A9 FF 9D F9 07 A0 54 8C 5A
C298: 0B D4 C8 8C 0B D4 86 04 38
C2A0: A0 3F BE 80 3F A9 00 9D 46
C2A8: C0 3F EE 3E C5 D0 FB EE 57
C2B0: 3E C5 D0 FB 98 0A 0A 8D BB
C2B8: 08 D4 88 10 E5 A5 04 0A C7
C2C0: A8 A9 00 99 03 D0 38 A9 62
C2C8: 1A ED 6E C5 AA 20 19 C3 AC
C2D0: A6 04 BD 84 C5 9D 43 C5 2A
C2D8: BD 7D C5 9D 4A C5 A9 01 32
C2E0: 9D 51 C5 A9 00 9D 66 C5 09
C2E8: AD 1B D4 29 03 A8 B9 9D B2
C2F0: C5 9D 58 C5 B9 A1 C5 9D 31
C2F8: F9 07 A9 07 C0 03 F0 09 68
C300: AD 1B D4 29 07 A8 B9 A5 D5
C308: C5 9D 28 D0 AD 1B D4 29 2B
C310: 01 A8 B9 9A C5 9D 5F C5 96
C318: 60 A0 04 38 B9 78 07 69 F7
C320: 00 C9 3A 90 02 A9 30 99 2A
C328: 78 07 88 10 EF CA D0 E9 B5
C330: 38 AD 6D C5 E9 28 A8 AD B1
C338: 6E C5 E9 00 C9 06 90 06 BC
C340: 8D 6E C5 8C 6D C5 60 A0 C2
C348: 00 B9 78 07 D9 90 07 F0 E3
C350: 05 B0 0B 4C 69 C3 C8 C0 14
C358: 06 90 EE 4C 69 C3 A0 05 FC
C360: B9 78 07 99 90 07 88 10 63
C368: F7 A0 05 A9 30 99 78 07 F8
C370: 88 10 FA 60 AD 40 C5 D0 E8
C378: FB A9 01 8D 3F C5 18 A5 6F
C380: A2 69 78 C5 A2 D0 FC A9 E4
C388: 00 8D 15 D0 85 C6 EE 86 BD
C390: 02 A2 0A A0 0E 18 20 F0 17
C398: FF A9 EA A0 C4 20 1E AB 7C
C3A0: 18 A5 A2 69 0E C5 A2 D0 B1
C3A8: FC 20 E4 FF C9 00 F0 DE 44
C3B0: A2 0A 20 FF E9 4C B3 C0 28
C3B8: AD 0E DC 29 FE 8D 0E DC F1
C3C0: A5 01 29 FB 85 01 A9 D0 8D
C3C8: 85 3A A9 38 85 3C A0 00 CC
C3D0: 84 39 84 3B A2 04 B1 39 DF
C3D8: 91 3B C8 D0 F9 E6 3A E6 41
C3E0: 3C CA D0 F2 A5 01 09 04 5F
C3E8: 85 01 AD 0E DC 09 01 8D 9F
C3F0: 0E DC AD 18 D0 29 F0 09 95
C3F8: 0E 8D 18 D0 A9 00 A0 3F 07
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C408: 18 99 00 3B 18 98 69 09 18
```

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C428: AD 12 D0 10 03 4C C4 C4 A1
C430: AD 3F C5 F0 03 4C C0 C4 A8
C438: E6 05 A2 06 BD F9 07 C9 55
C440: FC B0 20 A4 05 C9 F8 B0 2B
C448: 0D BD 66 C5 D0 08 98 29 D9
C450: 07 F0 08 4C 63 C4 98 29 86
C458: 03 D0 08 BD F9 07 49 01 3D
C460: 9D F9 07 CA 10 D6 AD 40 9E
C468: C5 F0 2E AE 41 C5 C9 15 E1
C470: 90 08 38 A9 29 ED 40 C5 08
C478: A2 20 A8 8A 91 FB AD 1B C4
C480: D4 09 08 91 FD EE 40 C5 EA
C488: AD 40 C5 C9 29 90 31 A9 9A
C490: 80 8D 04 D4 A9 00 8D 40 EE
C498: C5 AD 42 C5 F0 0A CE 42 20
C4A0: C5 D0 1D A9 0A 8D 27 D0 8D
C4A8: AD 00 DC 29 03 A8 18 AD CD
C4B0: 01 D0 79 99 C5 C9 3C 90 F1
C4B8: 07 C9 B4 B0 03 8D 01 D0 51
C4C0: A2 D0 A0 00 8E 12 D0 8C D2
C4C8: 21 D0 A5 03 29 07 C0 00 54
C4D0: F0 02 A9 00 09 C0 8D 16 DA
C4D8: D0 AD 0D DC 29 01 F0 03 5F
C4E0: 4C 31 EA 4C BC FE 8E 08 E7
C4E8: 93 00 50 52 45 53 53 20 2B
C4F0: 41 4E 59 20 4B 45 59 00 E3
C4F8: 1F A9 AA 20 20 AB AC 20 25
C500: 20 AD AE 20 20 AF B0 20 3D
C508: 20 AB AC 20 20 B1 B2 0D 32
C510: 0D 20 20 1C 53 43 4F 52 B1
C518: 45 20 05 30 30 30 30 30 73
C520: 30 20 20 95 4D 49 53 53 63
C528: 45 44 20 05 30 20 20 20 67
C530: 9C 48 49 47 48 20 05 30 43
C538: 30 30 30 30 30 00 00 00 29
C540: 00 00 00 00 00 00 00 00 40
C548: 00 00 00 00 00 00 00 00 48
C550: 00 00 00 00 00 00 00 00 50
C558: 00 00 00 00 00 00 00 00 58
C560: 00 00 00 00 00 00 00 00 60
C568: 00 00 00 00 00 00 00 02 6A
C570: 04 08 10 20 40 80 FD FB 67
C578: F7 EF DF BF 7F 8A 76 62 E2
C580: 58 6C 80 94 44 56 68 7A D7
C588: 8C 9E B0 41 53 65 77 89 5F
C590: 9B AD 47 59 6B 7D 8F A1 94
C598: B3 00 01 FF 00 01 03 07 58
C5A0: 00 F4 F6 F8 FA 03 04 05 8C
C5A8: 07 08 0A 0D 0E 2E FD 00 09
C5B0: 00 00 00 F0 3E 01 80 00 61
C5B8: 54 3A 06 FF FF 00 00 80 CD
C5C0: 00 00 00 5A F1 AF FB FB B4
C5C8: 00 BF BF 00 FF FF 00 7F C7
C5D0: 3C 3C 3F 3C 3C 7F 00 F0 71
C5D8: 3C 3C F0 3C 3C F0 00 7C 28
C5E0: 3C 3C 3C 3C 3C 0F 00 3E 5B
C5E8: 3C 3C 3C 3C 3C F0 00 0F 16
C5F0: 3C 3C 3C 3C 3C 0F 00 F0 1E
C5F8: 3C 00 FC 3C 3C F0 00 0F AA
C600: 3C 3C 3C 3C 3C 0F 00 F0 2D
C608: 3C 3C 3C 3C 3C F0 00 3F 65
C610: 33 03 03 03 03 07 00 FC 53
C618: CC C0 C0 C0 C0 E0 05 54 22
C620: 00 0F BF C0 2B 88 00 2B 8E
C628: AA 00 2A AE 80 0E E8 00 23
C630: 3E BC 00 FF AA 00 FF EA C0
C638: 00 D5 FC A0 DA BC 90 3A 0E
C640: AA A4 3E AA A4 15 AB 14 F1
C648: 05 50 14 05 50 00 05 50 5C
C650: 00 05 50 00 0F 50 00 0F 14
C658: FC 00 0F FC 00 00 05 54 BA
C660: 00 0F BF C0 2B 88 00 2B CE
C668: AA 00 2A AE 80 0E E8 00 63
C670: 3E BC 00 FF AA 00 FF EA 01
C678: 00 D5 FC A0 DA BC 90 3A 4E
C680: AA A4 3E AA A4 15 AB 14 32
C688: 05 50 14 15 54 00 35 14 A4
C690: 00 FC 3F C0 FF 3F C0 3F CC
C698: 3F 00 00 00 00 00 05 54 31
C6A0: 00 0F BF C0 2B 88 00 2B 0F
C6A8: AA 00 2A AE 80 0E E8 00 A3
C6B0: 3E BC 00 FF AA 00 FF EA 41
C6B8: EA F5 7F A9 36 AA A9 3E 8B
C6C0: AA 85 3F AA 05 15 50 00 45
C6C8: 05 50 00 05 50 00 05 50 C8
C6D0: 00 05 50 00 0F 50 00 0F 94
C6D8: FC 00 0F FC 00 00 05 54 3B
C6E0: 00 0F BF C0 2B 88 00 2B 4F
C6E8: AA 00 2A AE 80 0E E8 00 E3
C6F0: 3E BC 00 FF AA 00 FF EA 81
C6F8: EA F5 7F A9 36 AA A9 3E CB
C700: AA 85 3F AA 05 15 50 00 84
C708: 05 50 00 15 54 00 35 14 10
C710: 00 FC 3F C0 FF 3F C0 3F 4C
C718: 3F 00 00 00 00 00 00 00 57
C720: 00 C0 C0 00 30 33 00 0C 11
C728: CC 08 2A BC 30 99 6D 30 4B
C730: CF 3F 80 99 6D 30 2A BC DD
C738: 30 0C CF 08 3C C0 00 00 49
C740: C0 00 03 00 00 00 00 00 04
C748: 00 00 00 00 00 00 00 00 48
C750: 00 00 00 00 00 00 00 00 50
C758: 00 00 00 00 00 00 03 00 5B
C760: 00 00 C0 00 3C C0 00 0C 2A
C768: CF 08 2A BC 30 99 6D 30 8E
C770: CF 3F 80 99 6D 30 2A BC 1E
C778: 30 0C CC 08 30 33 00 C0 AD
C780: C0 00 00 00 00 00 00 00 41
C788: 00 00 00 00 00 00 00 00 88
C790: 00 00 00 00 00 00 00 00 90
C798: 00 00 00 00 00 00 03 00 9B
C7A0: 00 00 C0 00 3C C0 00 0C 6A
C7A8: CF 00 2B CC 3C 96 E8 40 6C
```

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C7B0: 71 C7 A0 96 E8 40 2B CC 42
C7B8: 3C 0C CC 00 30 33 00 C0 F1
C7C0: C0 00 00 00 00 00 00 00 81
C7C8: 00 00 00 00 00 00 00 00 C8
C7D0: 00 00 00 00 00 00 00 00 D0
C7D8: 00 00 00 00 00 00 00 00 D8
C7E0: 00 C0 C0 00 30 33 00 0C D1
C7E8: CC 0C 2B CC 30 96 E8 40 A9
C7F0: 71 C7 A0 96 E8 40 2B CC 82
C7F8: 30 0C CF 0C 3C C0 00 00 0E
C800: C0 00 03 00 00 00 00 00 C3
C808: 00 00 00 00 00 00 00 00 08
C810: 00 00 00 00 00 00 00 00 10
C818: 00 00 00 00 00 00 00 00 18
C820: 00 00 00 00 14 C3 00 55 4D
C828: 4C 00 0D 5C C0 3B F7 4C 1E
C830: EA EB B0 3B F7 4C 0D 5C A0
C838: C0 55 4C 00 14 C3 00 00 72
C840: 00 00 00 00 00 00 00 00 40
C848: 00 00 00 00 00 00 00 00 48
C850: 00 00 00 00 00 00 00 00 50
C858: 00 00 00 00 00 00 00 00 58
C860: 00 15 00 00 35 43 00 0D FA
C868: 5C 00 03 1C C0 3B F7 4C 24
C870: EA EB B0 3B F7 4C 03 1C 96
C878: C0 0D 5C 00 35 43 00 15 30
C880: 00 00 00 00 00 00 00 00 80
C888: 00 00 00 00 00 00 00 00 88
C890: 00 00 00 00 00 00 00 00 90
C898: 00 00 00 00 00 00 00 00 98
C8A0: 00 00 00 00 03 0C 50 00 FF
C8A8: C5 54 33 95 F0 07 7F B8 BB
C8B0: FF BB BB 07 7F B8 33 95 30
C8B8: F0 00 C5 54 03 0C 50 00 23
C8C0: 00 00 00 00 00 00 00 00 C0
C8C8: 00 00 00 00 00 00 00 00 C8
C8D0: 00 00 00 00 00 00 00 00 D0
C8D8: 00 00 00 00 00 00 00 00 D8
C8E0: 00 00 01 50 03 05 70 00 AA
C8E8: D5 C0 33 93 F0 07 7F B8 76
C8F0: FF BB BB 07 7F B8 33 93 6E
C8F8: F0 00 D5 C0 03 05 70 00 F8
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C910: 00 00 00 00 00 00 00 00 10
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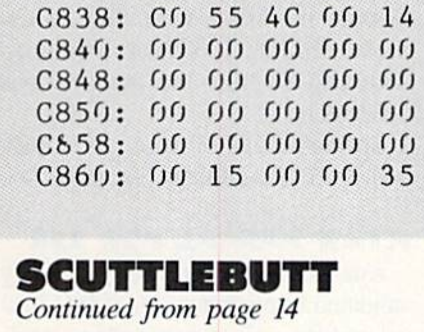
SCUTTLEBUTT

Continued from page 14

list, page 14).

SHOPPING PROGRAM

An aid in preparing a grocery list, *Shopping List* ($29.95) enables C-64 users to "walk" down 21 different on-screen aisles, selecting the names and quantity of items they wish to purchase. When they're finished, a list



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is printed. Over 800 different items are included.

Kledzik Company, 805-254-4720 (see address list, page 14).

C-64 BIBLE STUDY

Suitable for individuals or Christian education settings, the *Bible Bytes* memory game presents scripture in three activity formats for students aged 8 to adult: Word Blanks, Word Scramble, and Word Pop, with animation and musical rewards offered as reinforcement. A 50-verse range of preprogrammed scriptures is provided for study and memorization, with an Advanced Option Mode allowing for insertion and deletion of any 50 additional verses at one time. An optional timer mode is included for team competition. The program is offered in both New Testament and Proverbs versions for the C-64. Price is $29.95 plus $2.00 shipping.

Scriptural Software Unlimited, 619-434-2121 (see address list, page 14).

Bible Files On Disks offers the entire New Testament in *Paper Clip* files on four disks. Each chapter of each book is a separate file, making it possible to search the entire New Testament for any word or combination of words. Price is $39.95 plus $3.00 shipping; CA residents add 6.5% tax. The Old Testament will be available in early 1987 for $69.95.

John 1:1 Graphics, 213-422-5307–modem (see address list, page 14).

(See also *Bible Trivia* under the **Plus/4 Software heading**, page 11.)

PAPER CLIP SHIPS

After one of the longer delays in software development history, the eagerly awaited *Paper Clip II* (advertised in these pages as long ago as July) has at last begun shipping. Price of the C-128 word processor is $79.95. Included in the first shipment will be a free BI80 monochrome adaptor cable (for obtaining an 80-column mono display on a non-RGB monitor).

Batteries Included, 416-881-9941 (Canada) or 714-250-8723 (US) (see address list, page 14).

SIGHT AND SOUND

Two user port devices for the C-64, C-128, or SX64:

Eye-Scan ($89.95) takes in composite video via an RCA jack from a VCR or video camera. Conversion time is about 6 seconds per gray level, with 8 levels provided by the included disk software, along with pull-down windows for black and white imaging, image inversion, and disk and 1525 printer support. A utility package lets the programmer utilize the image in capturing algorithms in his own programs. *Eye-Scan* is compatible with the *Koala, DOODLE!,* and *Blazing Paddles* graphics programs. A 90-day limited warranty is

included.

The *Tardus-125* sound sampler ($98.95) offers a sampling rate of 1KHz to 30KHz and a sample time of 1.4 to 41 seconds, waveform screen plotting and printing, live effects like phlanger, reverb, chorus, slapback, echo, and pitch conversion, and sound dubbing, sequencing, and editing. Included are a programmer's utility package and sound/voice recognition software.

Digital Engineering and Design, 503-245-1503 (see address list, page 14).

BANNER ACHIEVEMENT

We hate devoting *Scuttlebutt* space to anything but new products of specific interest to Commodore users, but occasionally we get a press release we can't resist. Broderbund informs us that students at Thurston Middle School in Laguna Beach, California have printed a 1.7 mile long banner using *The Print Shop.* The banner, created to publicize a series of job education forums, took 420 students and 12 teachers two weeks to complete. The school has already shipped the banner to the Guinness Book of World Records—but we *know* some of our readers are going to want to beat it. So get printing! But please don't send your results here for verification.

CHRISTMAS CHORALES

Two C-64 music disks from Free Spirit, each $9.95:

The all-J.S. Bach *Music of the Masters IV* includes such works as English Suite No. 3 in G Minor, French Suite No. 5 in G, and selections from The Well-Tempered Clavier. All four disks in the series can be had for $31.95 (no shipping fee).

Christmas Classics includes 40 holiday favorites such as Jingle Bells, Joy to the World, and Twelve Days of Christmas.

Free Spirit Software, Inc., 312-352-7323 (see address list, page 14).

ACCOUNTING PROGRAMS

Accountant, Inc. ($99.95), an integrated accounting package for the C-128, utilizes the computer's extra memory, 80-column display, and greater disk storage. The three-module program consists of General Ledger (handles 140 accounts per disk, with no limit to the number of disks used), Accounts Receivable, and Accounts Payable (up to 960 customer and vendor accounts each).

The user enters data invoices and purchase orders as he would with a paper accounting system; the program generates those forms and automatically processes data. Financial reports generated include trial balance, income statement, balance sheet, and audit trails. Accounts receivable and payable balances are available, plus account histories, exception reports, and monthly statements. No knowledge of accounting is required.

Softsync, Inc., 212-685-2080 (see address list, page 14).

Modeled after the popular Dome Simplified Bookkeeping Records, *Dome Accounting by Computer* ($39.95) boasts easy setup procedures, automatic updating, and a collection of pop-up desk accessories including a perpetual calendar, a memo pad, and a calculator that can transfer the results of calculations directly into onscreen forms. Assorted reports are available, including a list of expense, income, and payroll items entered. An income statement that summarizes the activity of the business is also available.

Great American Software, 1-800-528-5015; in NH 603-889-5400 (see address list, page 14).

NEWSROOM CLIP ART

For use with Springboard's *The Newsroom* newspaper-layout program for the C-64, *Clip Art Collection, Volume 3* ($29.95) comprises more than 600 sports and recreation illustrations in such categories as baseball, football, tennis, skiing, aerobics, and fishing. The art can be used as drawn, modified with *The Newsroom's* editing tools, or combined with clip art from the two previous collections.

Springboard Software, Inc., 612-944-3915 (see address list, page 14).

KYAN PASCAL FOR 128

Kyan Pascal/128 ($69.95), a fully validated implementation of ISO Pascal and the only native code compiler which runs in true C-128 mode, is designed to help both students and advanced programmers learn the Pascal language and develop programs that run more than 30 times faster than BASIC. Included is an 80-column editor, a native code compiler, a macro-assembler, and assorted programming utilities. Also featured are Pascal extensions like "include" files, object module chaining, string handling, random files, random numbers, and Commodore graphics. The built-in macro-assembler lets programmers add in-line assembly source code to Pascal programs.

Kyan Software, Inc., 415-626-2080 (see address list, page 14).

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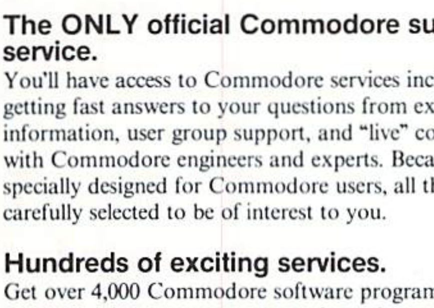
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